34th Year OCTOBER, 1950

RUBBER AGE

USE

TUADS . . . . AS A

GENERAL PURPOSE VULCANIZING AGENT.
A POWERFUL ULTRA-ACCELERATOR WHEN
USED IN SMALL AMOUNTS WITH SULFUR.
MAKES A VERSATILE TEAM WHEN USED
WITH ***ALTAX***, THUS OFFERING A WIDE
RANGE OF CURES TO THE COMPOUNDER.

R. T. VANDERBILT CO. INC.
230 Park Avenue, New York 17, N. Y.

Look to Du Pont for a COMPLETE line of

THIURAM ACCELERATORS

THIONEX (Tetramethylthiuram monosulfide)

Versatile Thionex is an effective, economical primary or secondary accelerator for rubber, GR-S and Buna N. The delayed curing action of Thionex results in excellent processing safety and makes it ideal for stocks requiring good mold flow. In wire insulation compounds Thionex provides fast cures and excellent electrical properties. GR-S stocks accelerated with Thionex are not only safe-processing and fast-curing—they have a long curing range.

As an activator for thiazoles, Thionex is safer-processing and more economical than guanidines or dithiocarbamates.

Available in dustless grain form for ease and convenience in handling.

THIURAM M (Tetramethylthiuram disulfide)

Thiuram M may be used either as a primary or secondary accelerator. And, since 13% by weight of Thiuram M is sulfur available for curing, Thiuram M can be substituted for sulfur as a vulcanizing agent. Non-sulfur or low-sulfur compounds accelerated with Thiuram M have excellent resistance to aging and heat deterioration and display extremely low compression set values. As an activator for thiazole accelerators, Thiuram M is excellent.

It is available in dustless grain form for ease and convenience in handling.

Thiuram E (tetraethylthiuram disulfide) is also available from Du Pont.

TETRONE A (Dipentamethylenethiuram tetrasulfide)

Tetrone A is an excellent accelerator and vulcanizing agent for low-temperature curing of rubber compounds. It contains 25% by weight available sulfur—is active at temperatures as low as 230°F. Compounds vulcanized with Tetrone A have low set and outstanding heat resistance.

In latex, Tetrone A is also a valuable activator for thiazoles, such as Zenite. Compounds accelerated with such combinations are fast-curing and have excellent aging properties.

And, of real importance, Zenite-Tetrone A combinations have minimum tendency to precure and do not adversely affect stability.

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For samples, see your Du Pont representative or write E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division, Wilmington 98, Delaware.

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BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

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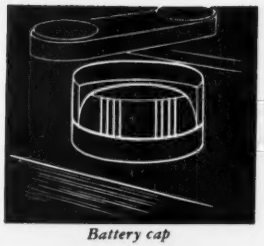
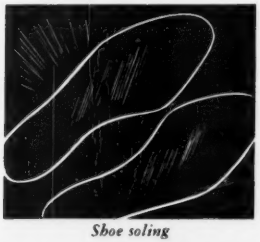


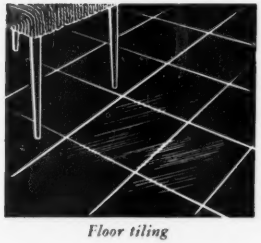
Battery cap

Drain board mat

Strainer for kitchen use



Shoe soling



Floor tiling

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easy-processing, reinforcing agent

Improves your rubber compounding

. . . gives faster, smoother extrusions

. . . saves time by eliminating masterbatching

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Remove the nerve the easy way!

You always get smooth, accurate extrusions with Philblack A or Philblack O. Rubber stocks mix promptly . . . without balky nerve difficulties. Furthermore, uncured stocks compounded with the Philblacks possess desirable plasticity, workability and excellent mold flow. When compounding, include either or both of these fast-curing, easy-processing Philblacks.

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Test for the best

DON'T take our word for it. Test PLIOLITE S-6B against every resin on the market. That's the *real* way to find the resin that's best for your products when you're evaluating a reinforcing resin.

Compare PLIOLITE S-6B with other resins you've tried for shoe soles, flooring, molded and inflated items, electrical insulation and a wide range of other items. Compare on the basis of every characteristic you want in a reinforcing resin—not just one, but all of them in combination.

You'll find—as we did after many comparisons in our own and independent laboratories—that PLIOLITE S-6B, Goodyear's new, easily processed resin, is superior to any other available resin in the majority of the properties you're looking for in a reinforcement.

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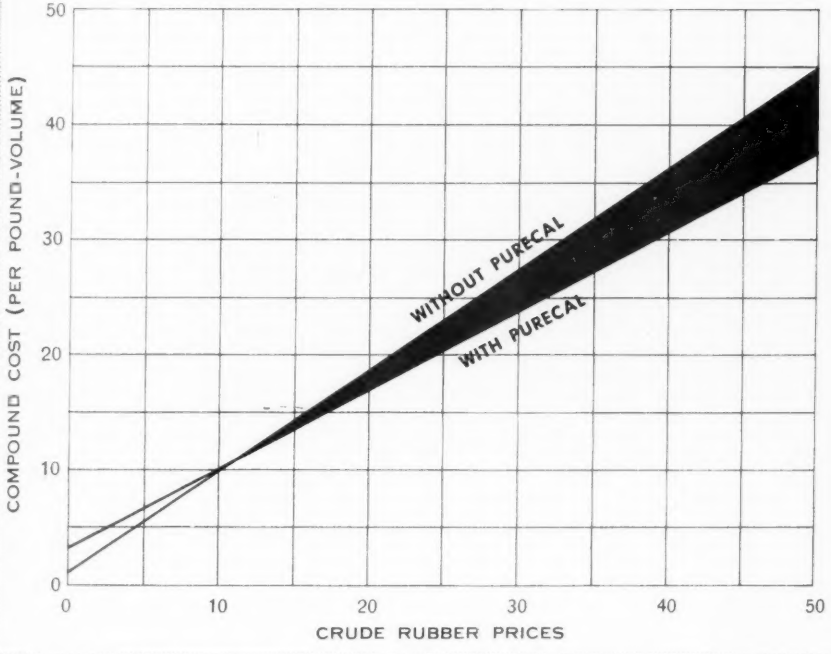
Pliolite—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Purecal U Cuts Compound Cost



TAKE another look at that chart. It will show you exactly how much you save by using Purecal* U as an extender. You'll notice the savings begin at a fraction of a cent when crude rubber costs 11 cents per pound. You'll notice, too, that those savings can climb to three . . . four . . . five . . . even seven cents per pound-volume depending upon the price of crude rubber.

But that's only part of the story. In the formula on which this chart was based, Purecal U: (1) increased tear resistance 100%, (2) decreased curing time 75%, (3) maintained original "pure gum" tensile properties and hardness.

It will pay you to get acquainted with Purecal U. In this period of rising prices, the advantages of Purecal are bound to become more and more considerable. Write for the free booklet: "PURECAL IN NATURAL RUBBER."

*Trade-mark

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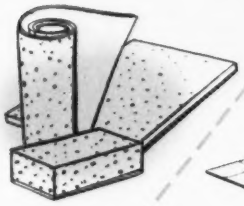
Marvinol-based calendered sheets have superior "dry hand" . . . are easily worked . . . have high stitch-tear resistance.

Cast, calendered or extruded Marvinol-based films have high tear strength . . . are easily processed, printed, embossed, sewn or heat-sealed.

Marvinol pays off with faster extrusion rates . . . makes end products with high resistance to cut-through, good electrical qualities.

Adaptable to injection, low pressure, compression, slush and blow molding, Marvinol gives strong, durable products with sharp detail.

Marvinol is being used in new vinyl compositions to make tough, lightweight cellular products.



Colorful, durable, high-style floor coverings are processed from high molecular weight Marvinol formulations.

FOR SUPERIOR physicals, Marvinol VR-10. For ease in processing, plus good physicals, Marvinol VR-20. Now both Marvinol resins give processors the characteristics that make sales. Stability under heat, light and time; dimensional stability; low temperature flexibility; resistance to wear, tear, oils and acids.

Let us show you how to utilize these extras in Marvinol. All technical information developed in our modern laboratories is at your disposal since it is through you that Marvinol-based products reach the consumer. Write today for the latest technical information. Dept. R-10, NAUGATUCK CHEMICAL, Naugatuck, Connecticut. *In Canada*, Naugatuck Chemical, Elmira, Ontario.

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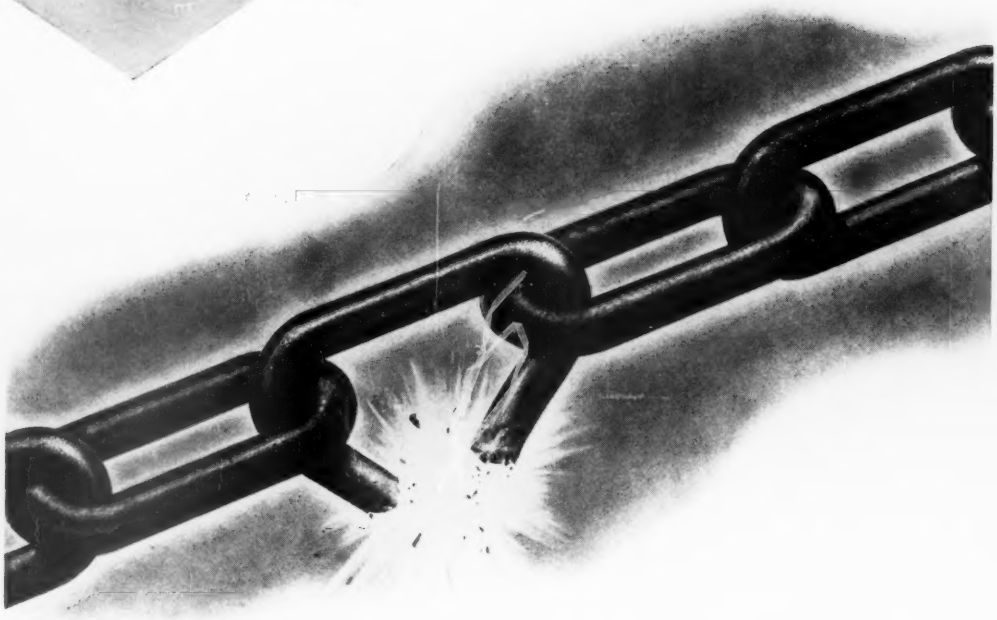
Chemicals you live by



An old adage applies to Vinyl Plastics

The extender you use in your vinyl plastic can be the weak link in the finished product if it falls short in purity or uniformity.

You expect high standards of quality in resins, plasticizers and stabilizers because they are *chemically produced* under scientifically controlled conditions. You are assured of equally high standards in your vinyl extender when you specify one of DIAMOND'S line of Precipitated Calcium Carbonates, since they, too, are *chemically produced*, with resultant close control of purity and uniformity.

DIAMOND ALKALI makes eight grades of Precipitated Calcium Carbonates, in a wide range of particle sizes, and with various physical and chemical properties. Our Technical Service Staff is available to work with you to determine which grade best suits your requirements. Just call your nearest DIAMOND Sales Office, or write us direct.

DIAMOND PRECIPITATED CALCIUM CARBONATES: Multifex*, Super Multifex*, Multifex MM*—Kalite*, Millical*, Suspenso—Non-Fer-Al*, Surfex*.

WRITE FOR OUR BULLETIN ***"Dispersing Calcium Carbonates in Vinyl Plastics"***.

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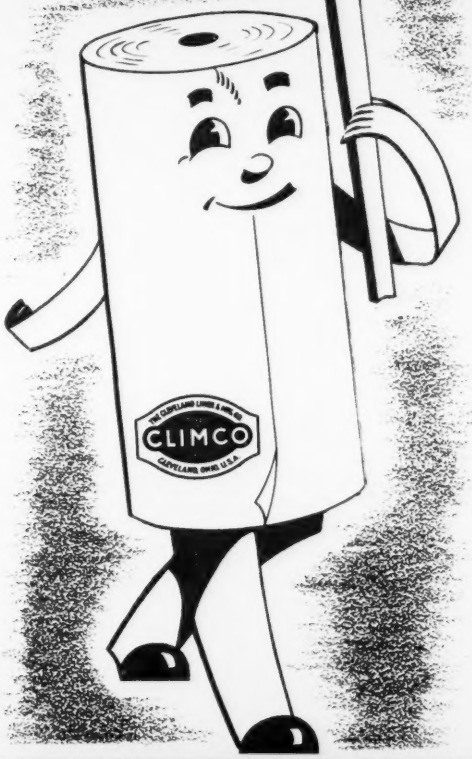
DIAMOND CALCIUM CARBONATES

DIAMOND ALKALI COMPANY . . . CLEVELAND 14, OHIO

MR. CLIMCO SAYS . . . .

CLIMCO LINERS

save time at the bias cutter and cutting table



Perfect separation of stock and liner is all important during these operations—for stock adhesions at either point cause expensive down time. You can avoid such production headaches by using Climco Processed Liners that can be readily peeled from the stock without sticking.

Climco Processing of your liners assures many other profitable advantages: Liner life is greatly increased, tackiness of the stock is preserved, and gauges are more easily maintained. Latitude in compounding is enlarged, lint and ravelings are eliminated and horizontal storage is facilitated.

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Treatment Contains
NO OIL OR WAX
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PROCESSED LINERS

Serving the Rubber Industry for 26 Years

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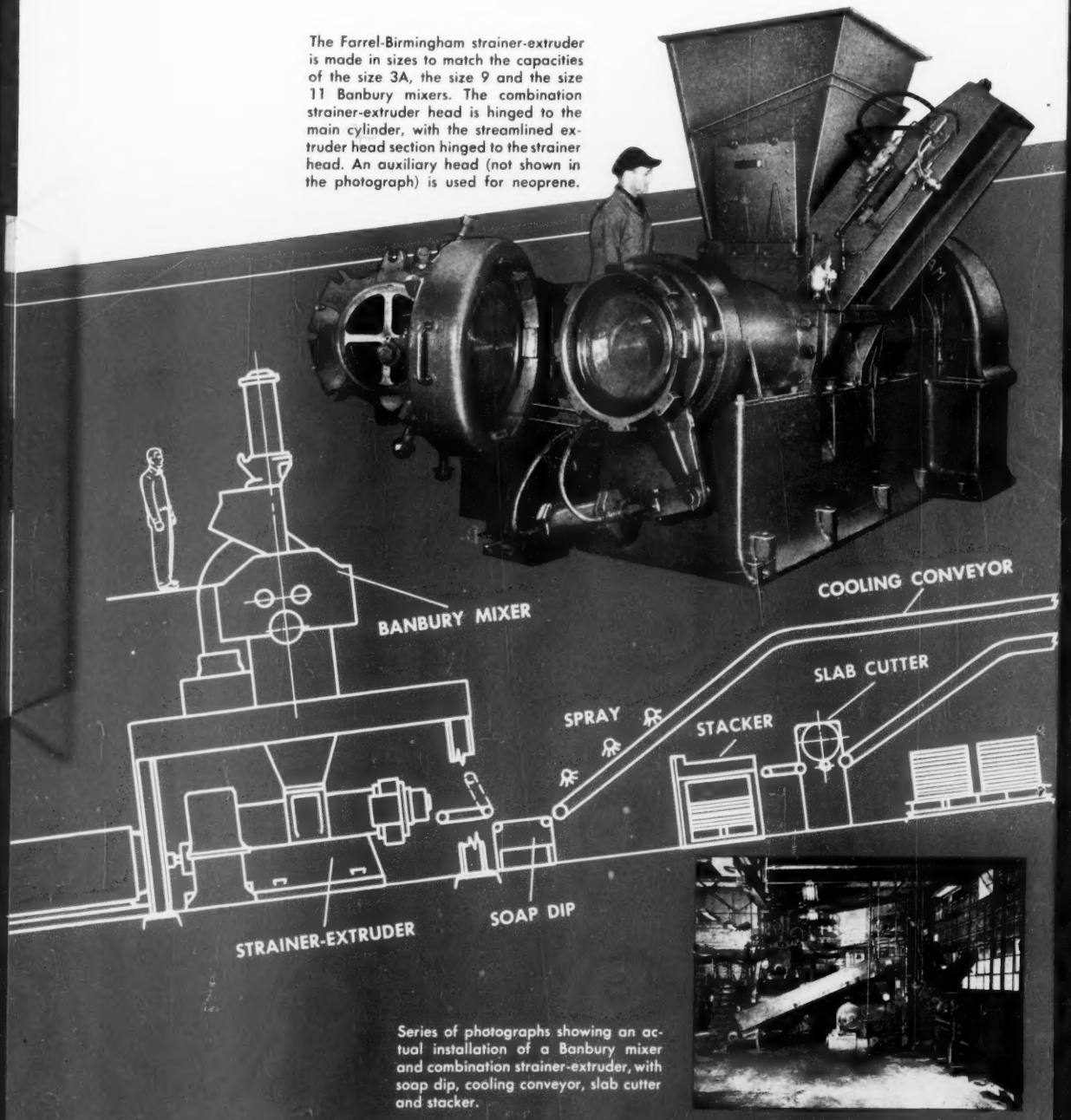
NEW STRAINER-EXTRUDER SYSTEM

The Farrel-Birmingham strainer-extruder is made in sizes to match the capacities of the size 3A, the size 9 and the size 11 Banbury mixers. The combination strainer-extruder head is hinged to the main cylinder, with the streamlined extruder head section hinged to the strainer head. An auxiliary head (not shown in the photograph) is used for neoprene.



Series of photographs showing an actual installation of a Banbury mixer and combination strainer-extruder, with soap dip, cooling conveyor, slab cutter and stacker.

DEVELOPED BY FARREL-BIRMINGHAM

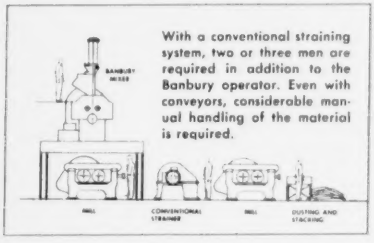
ONLY ONE OPERATOR REQUIRED TO CONTROL ENTIRE SYSTEM OF MIXING, STRAINING, EXTRUDING, SOAPING, STACKING

This new strainer-extruder system has a number of advantages over the conventional straining system. A continuous flow of production can be maintained at all times, the labor required for operation of the system is greatly reduced, and manual handling of stock is eliminated completely.

OPERATION SIMPLIFIED

A combination strainer-extruder replaces the conventional mill under the Banbury. This unit takes the Banbury batch (either direct from the mixer or by conveyor), strains it or extrudes it, or both.

With a cooling conveyor incorporating a dip unit, slab cutter and stacker, material from the Banbury is automatically strained, extruded, soaped and stacked in neat piles. The two or three men, required by a conventional system, are no longer needed. The Banbury operator controls the entire system. Not a pound is lifted or carried manually.



With a conventional straining system, two or three men are required in addition to the Banbury operator. Even with conveyors, considerable manual handling of the material is required.

THE STRAINER-EXTRUDER UNIT

Constant feed to the screw of the strainer-extruder is provided by an automatic air-operated ram in the hopper. A hinged side of the hopper may be placed in position to form a by-pass when desired.

For temperature control, the main cylinder and extruder head are cored for steam or water circulation, and the screw is drilled and provided with a rotary joint and distributor pipe. Extrusion is usually in a tube, split to form a strip, which can be varied in thickness. Other extruded shapes may be obtained by changing the extruder head section.

FOR MORE INFORMATION

A Farrel-Birmingham engineer will be glad to discuss the advantages of this new, efficient system with you. A request for an appointment, or for further details by mail, will involve no obligation.

FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. *Sales Offices:* Ansonia, Buffalo, New York, Akron, Chicago, Los Angeles, Houston

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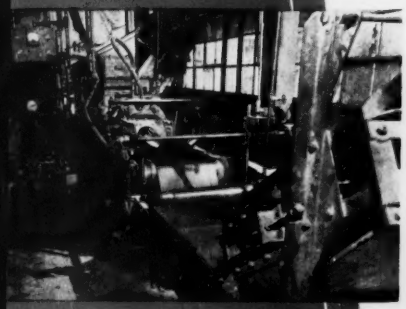

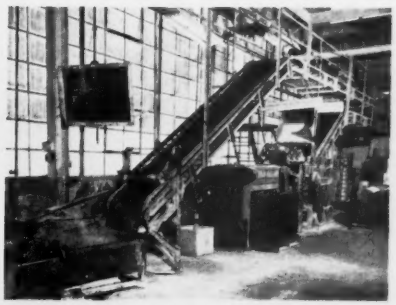

F-B PRODUCTION UNITS

Banbury Mixers
Plasticators
Pelletizers
Mixing, Grinding, Warming and Sheeting Mills
Bale Cutters
Tubing Machines
Refiners
Crackers
Washers
Calenders
Hose Machines
Hydraulic Presses
And Other Equipment for Processing Rubber and Plastic Materials

FB-631

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economical processing

Perhaps you too can eliminate expensive master-batching operations by using truly Easy Processing MARBON "8000" reinforcing resin.

Also save dollars by benefiting from Lower Power Consumption when using "8000" resin in your Light-Colored, High-Hardness, Low-Gravity Compounds.

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Do your rubber products have the sniff that **sells?**

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TRADE MARK

Give your rubber products more customer appeal with "Alamask" odorants! Often times, it's the sniff that *sells*.

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Du Pont **"Alamask"** odorants
TRADE MARK

Find out more! Send for the booklet "Odorants for the Rubber Industry"—or ask us for specific recommendations for your individual problems. Write—E. I. du Pont de Nemours & Co. (Inc.), Organic Chemicals Department, Aromatics Section, Wilmington 98, Delaware. Branch Offices: Atlanta, Boston, Charlotte, Chicago, New York, Philadelphia, Providence, San Francisco.

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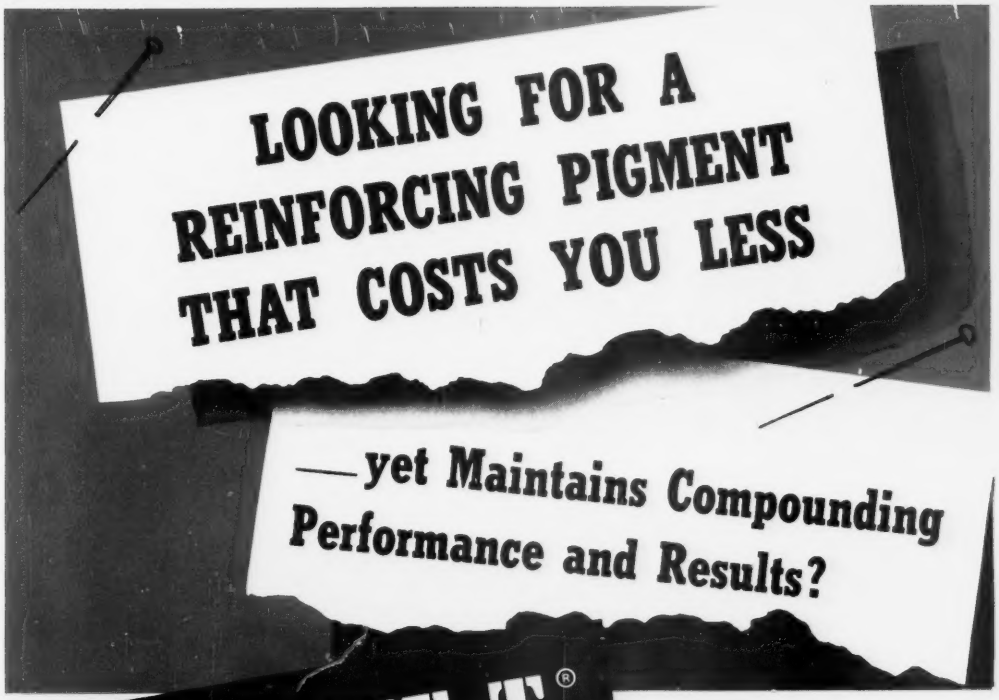
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



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MAY BE YOUR ANSWER

Properties and Characteristics

CALCENE T is a precipitated calcium carbonate with tall oil coating averaging 0.1 micron. It has low modulus, good tensile strength, high hot tear resistance, good abrasion, excellent processing, smooth fast extrusion, and very slight activation of some accelerators.

Among the applications of Calcene T are inner tubes, tire carcass stocks, footwear, insulated wire and mechanical goods, heels and drug sundries.

When compared with various other widely used pigments, Calcene T makes possible substantial savings in many cases on delivered pound volume cost.

The ease and feasibility of using Calcene T to replace costlier pigments—either fully or partially—*plus* the good possibility that Calcene T will provide better compounding and product performance, warrant your prompt investigation.

Free working samples of *CALCENE T*—as well as Columbia's other pigments, *SILENE EF* and *HI-SIL*—are available upon request. Pittsburgh Plate Glass Company, Columbia Chemical Division, Fifth Avenue at Bellefield, Pittsburgh 13, Pennsylvania.

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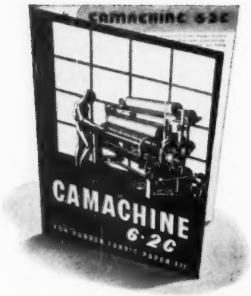

For fast production of top quality rolls of plain and friction-coated fabrics, proofed goods, natural and synthetic rubber goods, and similar materials, investigate the *Camachine 6-2C*.

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Camachine engineers will be pleased to consult with you on any roll production problem.

AA-2250

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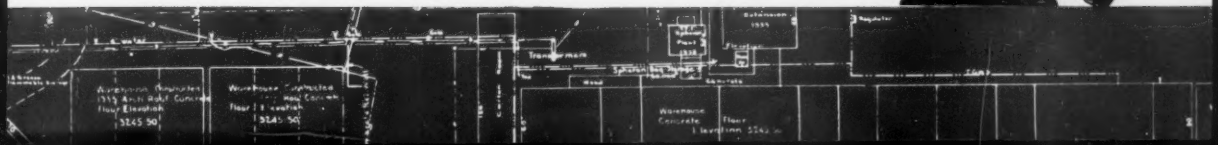
Right now all existing facilities are being operated at their maximum potential. Soon there will be new Cabot units ready for action . . .

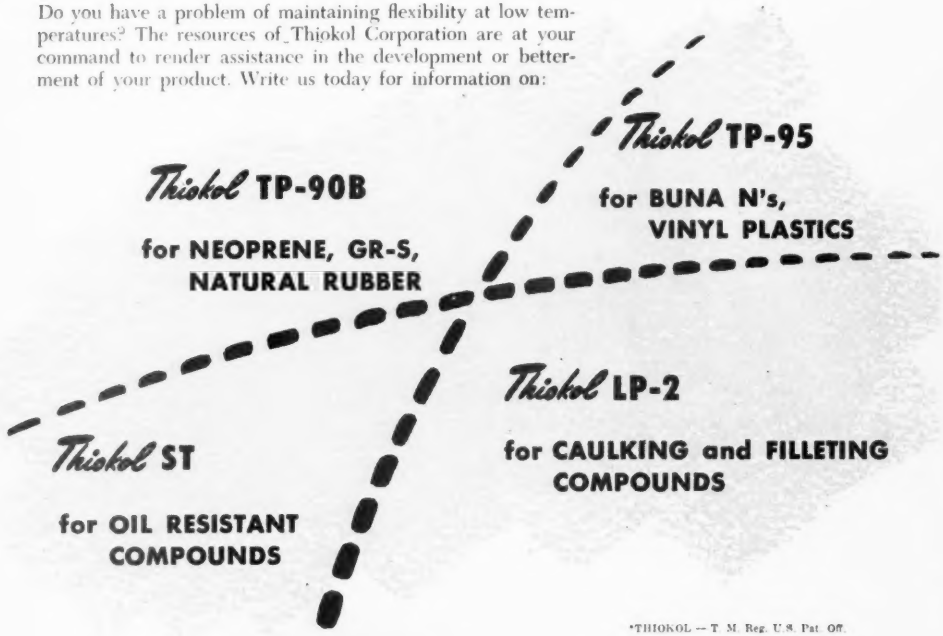


Flexibility at Low-temperature?

YES — with THIOKOL° PRODUCTS. The addition of TP-90B or TP-95 to your product, whether it be of natural rubber, neoprene, GR-S or the nitrile rubbers, adds the plus-factor of flexibility at extreme low temperatures.

For specialty applications requiring low temperature resistance without the use of plasticizers, try *Thiokol ST* synthetic rubber. If it is a caulking or filleting application, investigate the advantages of *Thiokol LP-2* liquid polymer. Both have excellent solvent resistance.

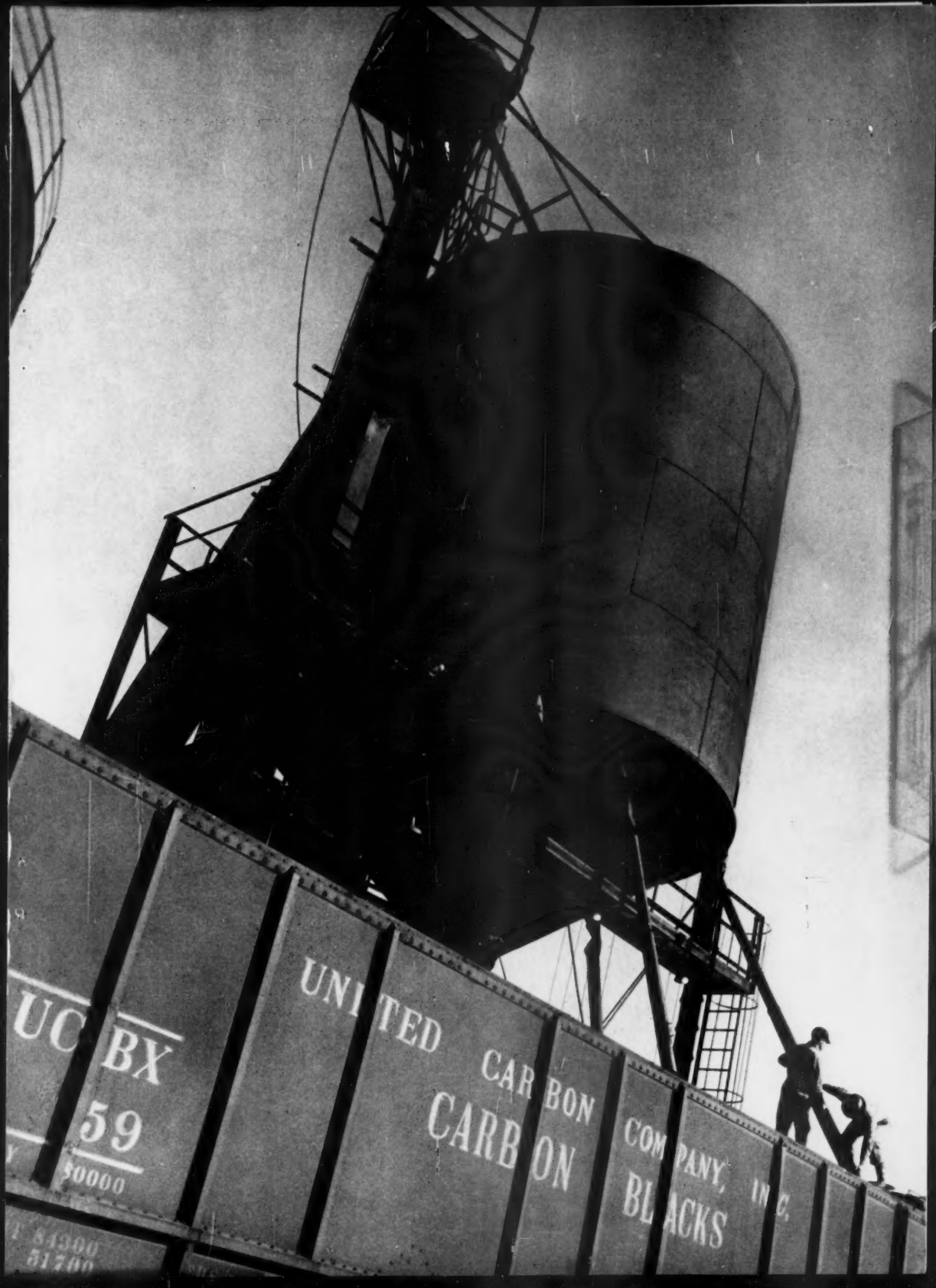
Do you have a problem of maintaining flexibility at low temperatures? The resources of Thiokol Corporation are at your command to render assistance in the development or betterment of your product. Write us today for information on:



°THIOKOL — T. M. Reg. U.S. Pat. Off.

Thiokol

THIOKOL CORPORATION • 783 NORTH CLINTON AVENUE • TRENTON 7, NEW JERSEY


UC BX
59
UNITED CARBON
CARBON
COMPANY, INC.
BLACKS

UNITED BLACKS, made with engineering and scientific skill to meet the needs of the rubber industry, are "packaged" to suit the convenience of the user. In this photo a hopper car is being filled; distinctive United Carbon bags, plainly printed for ease in handling and selecting, are another medium which United uses to make handling convenient, fast, and easy for the user.

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IN NATURAL AND SYNTHETIC ELASTOMERS

"CUMAR" Resin, RH Grade, is used to impart many desirable properties to fabricated and laminated items, camelbacks, tire-repair stocks, footwear, printers' rolls, rubber-to-rubber and rubber-to-metal parts, adhesives, cements, and solutions.

1 TO IMPROVE ADHESION

Used in conventional proportions, "CUMAR" Resin, RH grade, does not cause sulfur bloom to occur on raw compounded stocks. It confers tack to the stocks and prevents them from drying out over long storage periods, thus promoting better adhesion.

2 AS A PROCESSING AID

"CUMAR" Resin, RH grade, lowers viscosity, modifies the nerve, and reduces shrinkage; thus contributing to smoother and faster processing, calendering, and extruding properties.

3 FOR EXTENDING THE ELASTOMER

"CUMAR" Resin, RH grade, is unusually effective as an extender. It permits increased loadings with no sacrifice in quality, thus allowing reduced compounding costs.

4 FOR CEMENTS

"CUMAR" Resin, RH grade, accelerates breakdown time of rubber, and improves tack.

5 IN RUBBER-METAL ADHESION APPLICATIONS

"CUMAR" Resin, RH grade, promotes stronger adhesion between rubber and metal. Applied in 2% to 5% solutions in benzol or similar aromatics, the resin forms a tough film on brass-plated or sand-blasted metal surfaces, preventing the formation of rust or scale prior to the application of bonding cement or tie gum stock.

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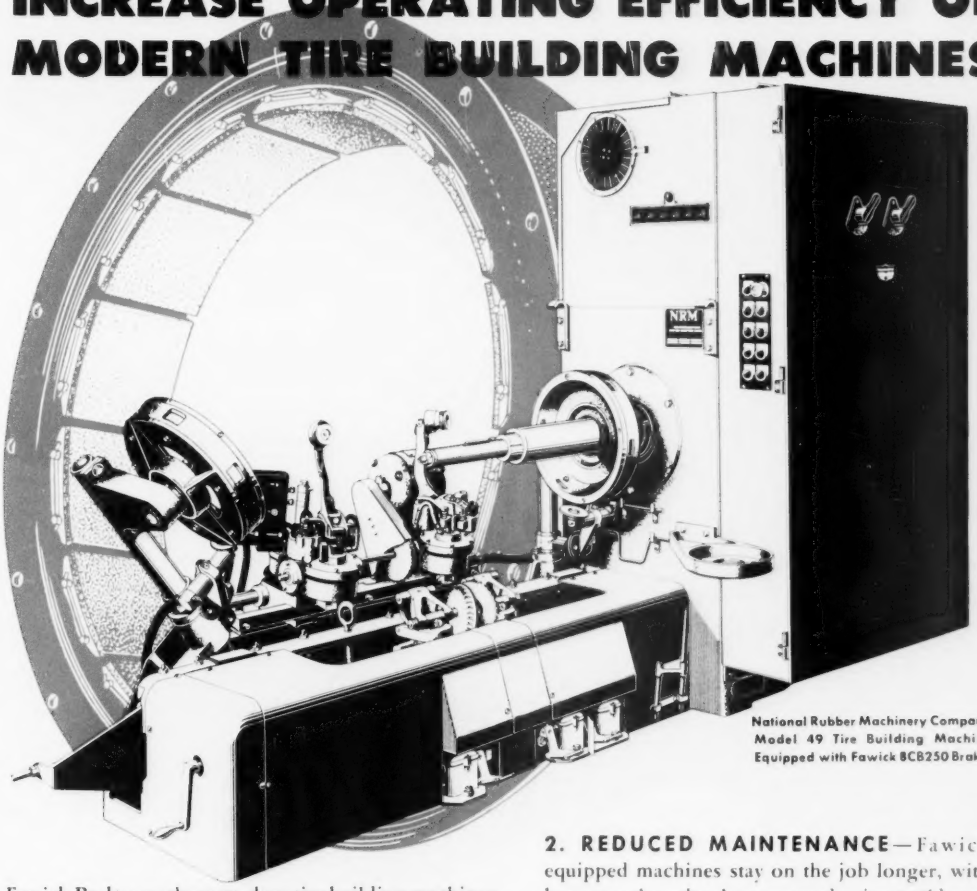

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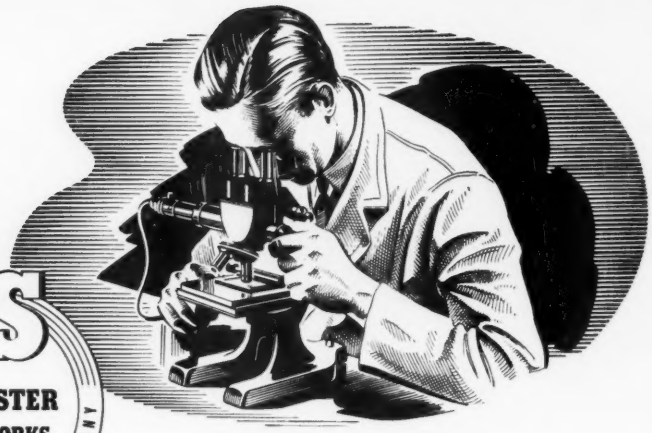

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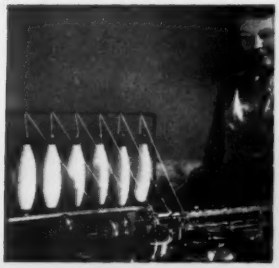

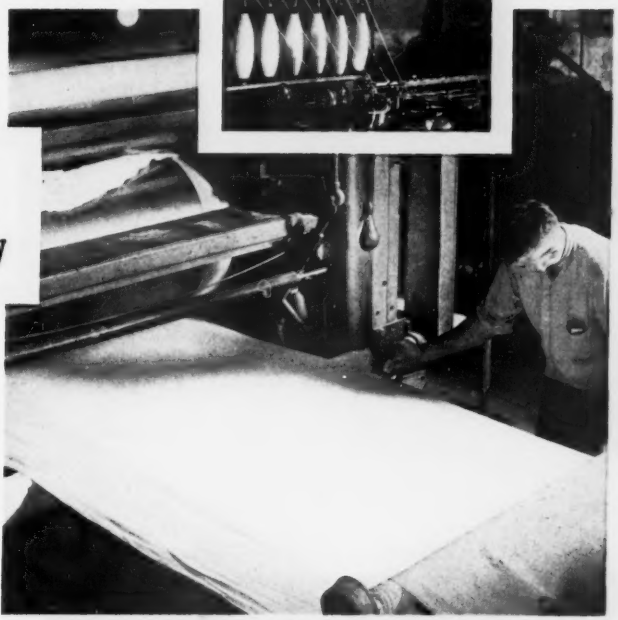

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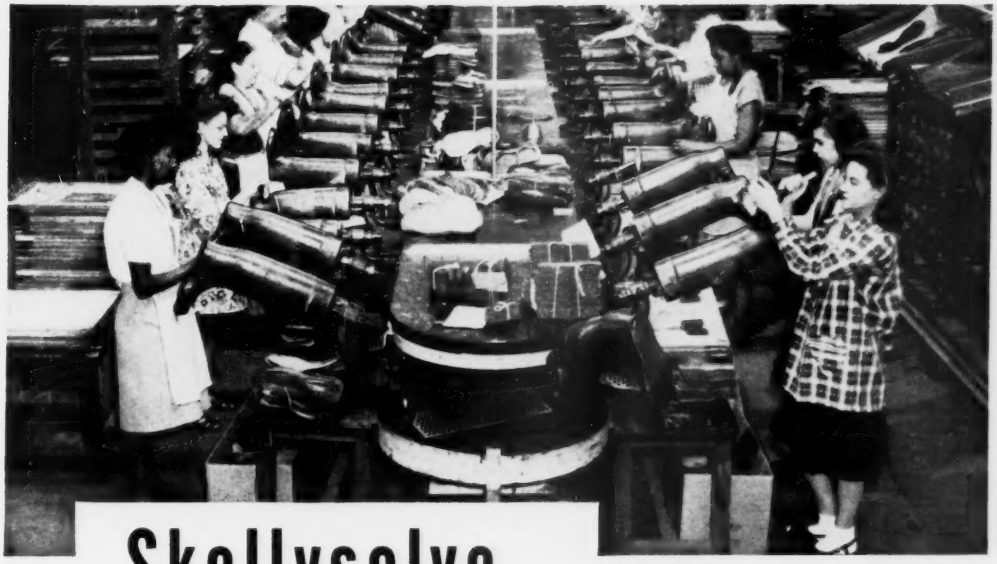

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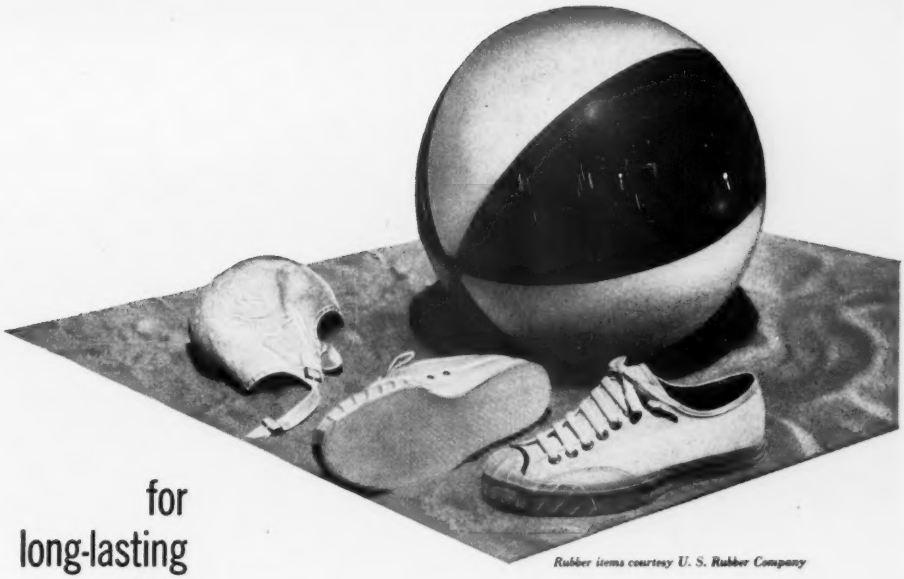

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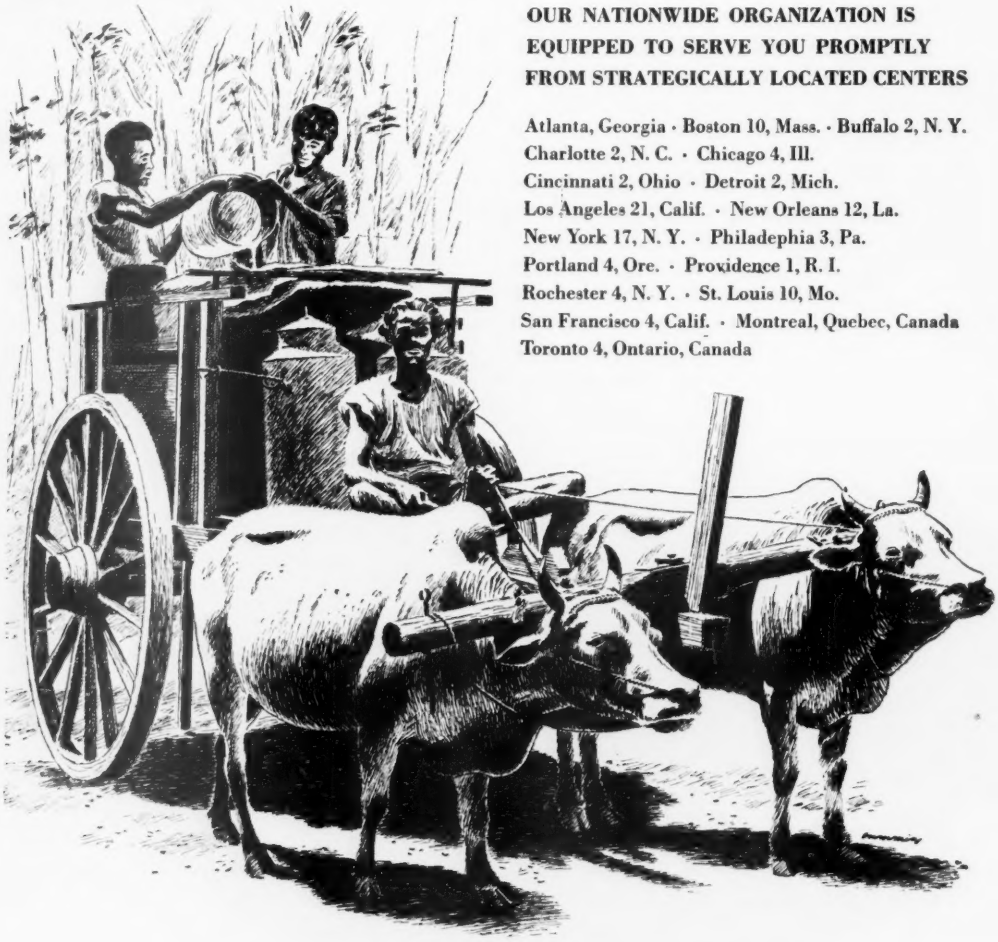
Crude rubber and natural latex



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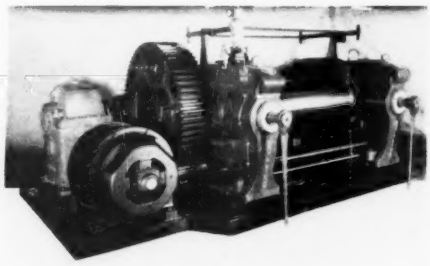

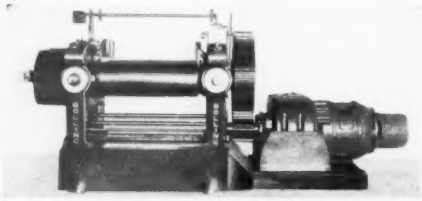

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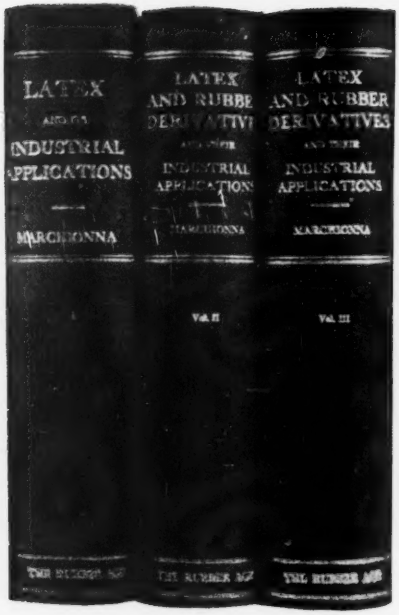

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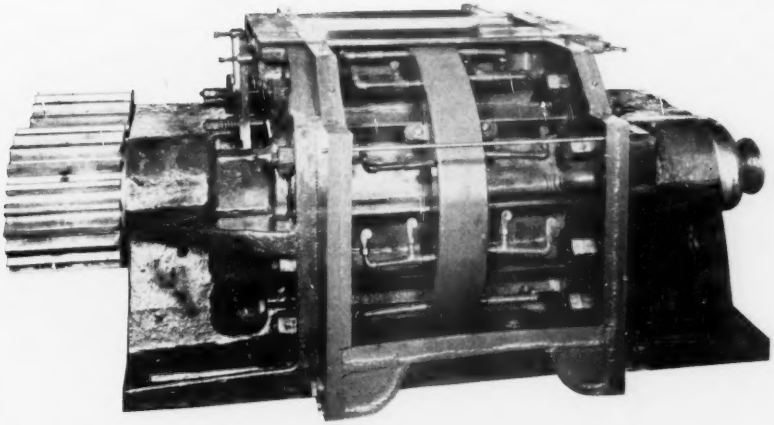

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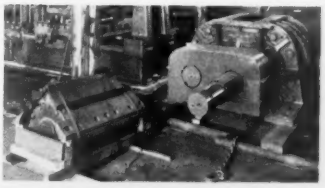

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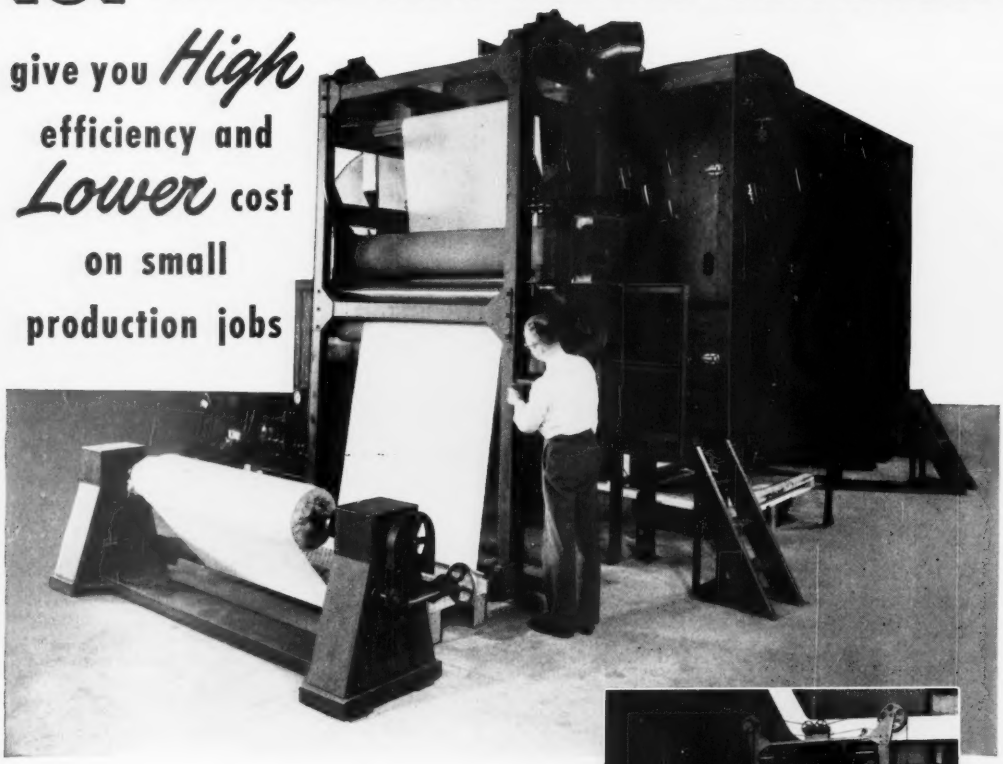

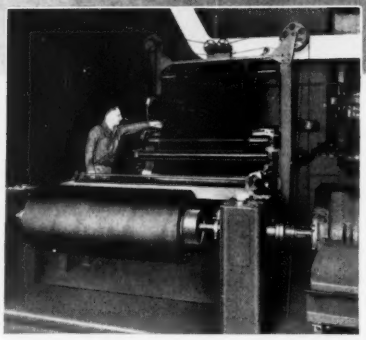

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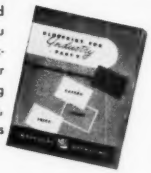

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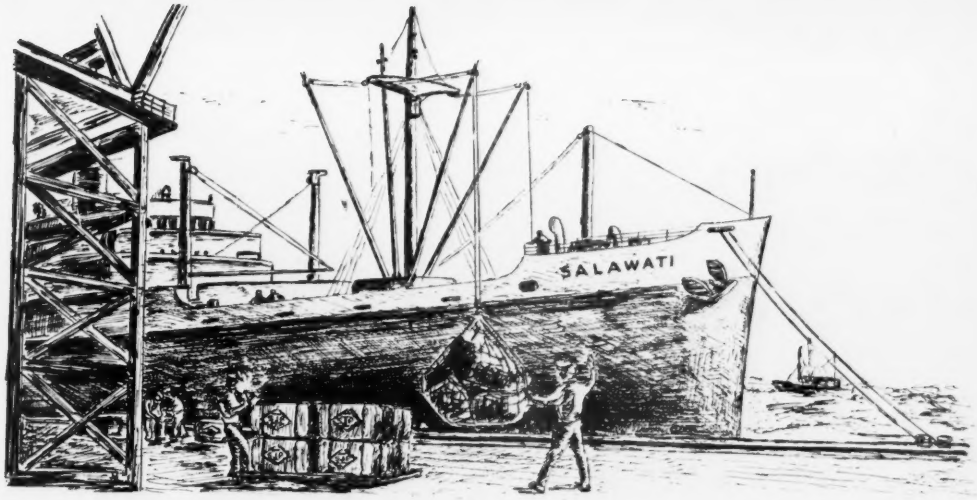

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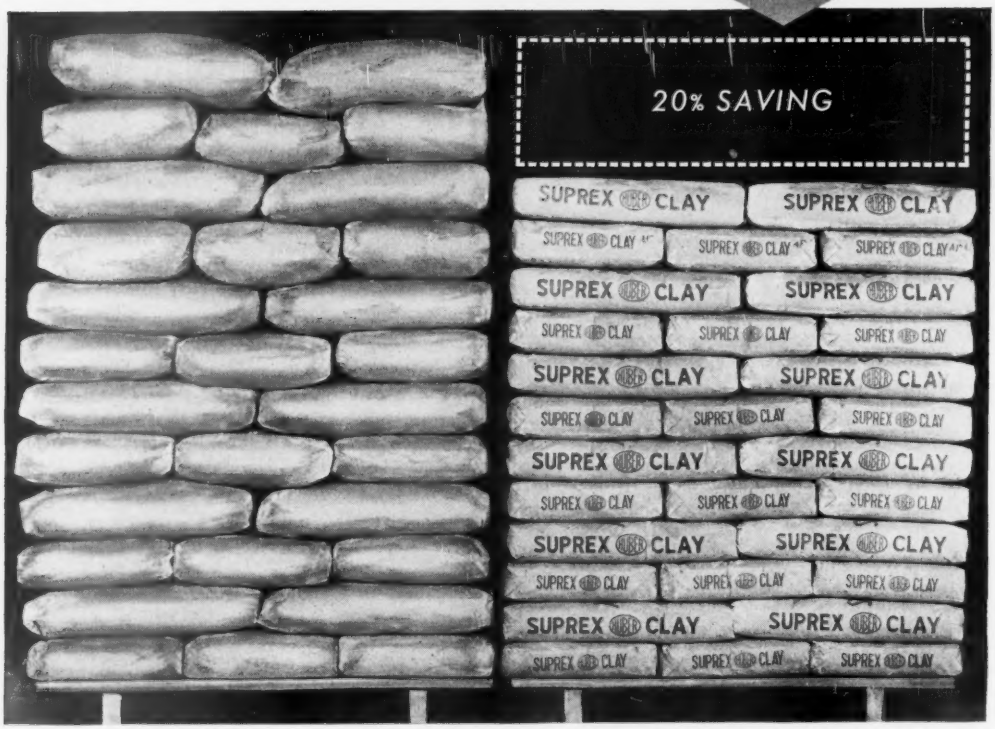

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RUBBER AGE

Vol. 68, No. 1 OCTOBER, 1950

Reclaiming Agents for Natural and Synthetic Rubber

I-Solvent Naphtha

By D. S. le BEAU

Midwest Rubber Reclaiming Co., East St. Louis, Ill.

SOLVENT naphtha has been used as a reclaiming agent for vulcanized natural rubber scrap over a number of decades. It has been well known to the manufacturer of reclaim that solvent naphtha obtained from the coking of coal would in most cases form a reclaim possessing good properties while solvent naphtha obtained from petroleum could not be considered an adequate reclaiming agent and could not be used for that purpose. However, the coal tar naphtha obtained from different sources of supply varied considerably in its reclaiming effect, even though such laboratory tests as distillation and specific gravity appeared to conform to specifications.

The variability of one of the raw materials used in the manufacture of reclaim will naturally affect the uniformity of the finished reclaim and, therefore, it was first of all necessary to determine the causes for the variability of the reclaiming effectiveness and then introduce means for the control of the uniformity of the finished reclaim. This paper is concerned with the causes of the variability of the reclaiming effectiveness of solvent naphtha.

Hydrocarbon Nature of Naphthas

Coal tar, as well as petroleum naphthas, consist of a mixture of hydrocarbons. The composition of the coal tar naphtha (within a given range of distillation) will depend on the type of coal carbonized and the conditions of distillation, such as temperature and time of distillation, nature of retort and size of charge *(11, 19)*. High coking temperatures were found to cause the production of more aromatic hydrocarbons while low temperatures result in the formation of predominantly paraffins and naphthenes. The general effect of high temperatures will be cracking of first products of distillation followed by a rearrangement in hydrogen distribution as well as other reactions. The hydrocarbon composition of the petroleum naphtha will also vary, depending on the methods of refining or cracking used *(9)*. Therefore, it was necessary to investigate the hydrocarbons present in the particular coal tar naphthas and in the petroleum naphtha and assert the effect of each of these hydrocarbons on the reclaiming of vulcanized natural, as well as synthetic (GR-S), rubber.

For this purpose, fractional distillations of each naphtha were carried out in a Todd *(15)* fractionation column. (Drop ratio 10:1). Fig. 1 shows the volume percent of hydrocarbons distilling over per degree centigrade for 3 different coal tar naphtha supply sources, as well as for the petroleum naphtha. (The particular petroleum naphtha was chosen because it conformed most closely to the distillation range of the three coal tar naphthas.) The differences in the composition of these three coal tar naphthas are quite evident from the distillation curve and are by no means minor ones.

Note: This paper was presented at the 56th Meeting of the Division of Rubber Chemistry, A.C.S., April 19-21, 1950, Detroit, Mich.

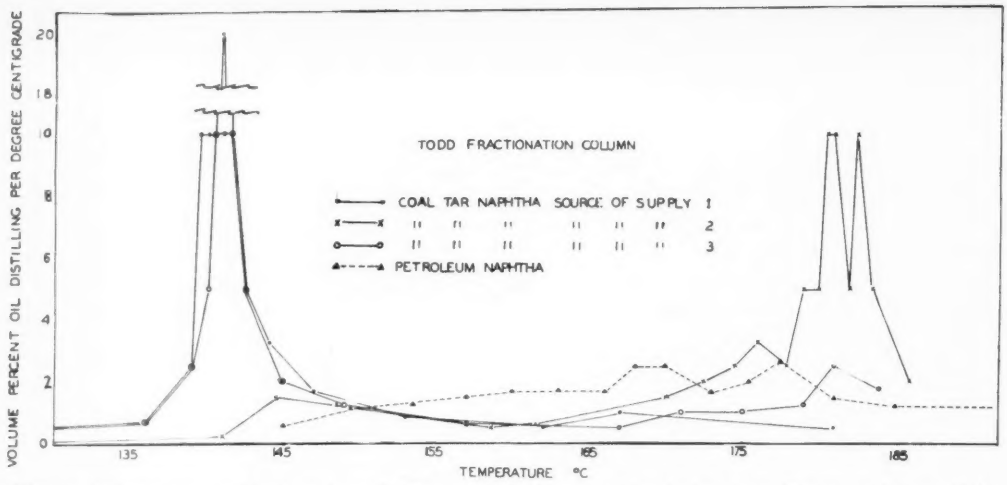
VOLUME PERCENT OIL DISTILLING PER DEGREE CENTIGRADE
TODD FRACTIONATION COLUMN
COAL TAR NAPHTHA SOURCE OF SUPPLY 1
" " " " " " 2
" " " " " " 3
PETROLEUM NAPHTHA
TEMPERATURE °C

FIG. 1—Volume percent of hydrocarbons distilling over per degree centigrade for three different coal tar naphtha supply sources and for petroleum naphtha.

Preliminary reclaiming orientation experiments using various fractional cuts of the coal tar naphthas showed a difference in the behavior of the reclaims prepared therefrom. However, upon detailed refractionation of such naphtha cuts the effect of mixed boiling points which had been previously found *(11)* was predominating to such an extent that it was deemed more effective and accurate to scan the literature on coal tar and petroleum naphtha to determine the various hydrocarbons which had been recognized and to study the effect of each of these hydrocarbons separately on the reclaiming of vulcanized natural and synthetic (GR-S) rubber. Tables I and II list the hydrocarbons which usually occur in coal tar naphtha and petroleum naphtha and which are within the distillation range of the originally fractionated naphthas.

It will be seen that some of the hydrocarbons listed in Tables I and II occur in both coal tar as well as petroleum naphtha. The petroleum naphtha which was used was tested and found not to contain any unsaturated compounds. Preliminary reclaiming orientation experiments on the petroleum naphtha cuts showed that none of the cuts exhibited any reclaiming action whatsoever. Therefore, attention was concentrated in detailed ex-

TABLE I—CONSTITUENTS OF COAL TAR NAPHTHA

Paraffins

Pentanes—B.P. 9-36° C.
Hexanes—B.P. 49-69° C.

Olefins

Pentenes—B.P. 49-51° C.
Hexenes—B.P. 67-70° C.

Cyclic Unsaturates

Cyclo pentadiene—B.P. 41° C.
*Dicyclo pentadiene—B.P. 170° C.
Cyclo hexene—B.P. 83.3° C.
Cyclo hexadiene—B.P. 79-85° C.

Aromatics

Benzene—B.P. 79.6° C.
Toluene—B.P. 110.8° C.
*Xylenes—B.P. 138.5-144° C.
*Mesitylene—B.P. 164.8° C.
*Ethylbenzene—B.P. 136.2° C.
*Styrene—B.P. 145-146° C.
*Cumene—B.P. 153-154° C.
Penta methyl benzene—B.P. 230° C.
Hexa methyl benzene—B.P. 265° C.
Naphthalene—B.P. 217.9° C.
*Indene—B.P. 181-182° C.
*Coumarone—B.P. 173-174° C.

Note: The hydrocarbon compounds marked with an asterisk (*) are those which fall within the distillation range of the coal tar naphthas investigated.

TABLE II—HYDROCARBONS WHICH MAY OCCUR IN PETROLEUM NAPHTHAS OF THE GIVEN DISTILLATION RANGE

Paraffins

Octanes
Nonanes
Decanes
Methyl substituted paraffins
Highly branched paraffins

Naphthenes

Substituted cyclohexanes such as
Dimethylcyclohexane
Trimethylcyclohexane
Ethylcyclohexane

Aromatics

Toluene
Xylene
Cumene
Mesitylene and other trimethyl benzenes
Ethylbenzene
Methylethylbenzene

Olefins, Diolefins

Nonenes
Decenes
Dodecenes
Methyl substituted hexadienes
Methyl substituted cyclohexadienes

periments on those hydrocarbons which occur in coal tar naphtha.*

Preparation of Test Reclaims

For the experiments, GR-S inner tubes and natural rubber peelings (tire tread) were ground in the laboratory on smooth rolls and subjected to open steam treatment (185 lbs.) for varying lengths of time to obtain a picture of the behavior of the polymers under reclaiming conditions and also in the presence of those hydrocarbons known to occur in coal tar solvent naphtha. It was decided to use vulcanized polymer scrap which had been subjected to previous use rather than to prepare such scrap from laboratory compounds. GR-S inner tubes were used because the selection of this scrap provided a safe means of segregation of the GR-S polymer from any natural rubber. Natural rubber peelings were preferred to natural rubber inner tubes because the nature of the tread compound permits the addition of larger amounts of reclaiming agents than those which can be used for reclaiming of natural rubber inner tubes. This, in turn, will result in a smaller experimental error.

As will be seen later, the amounts of hydrocarbons used were added on a weight basis rather than on a molar basis. While this is usually not a preferable method, it was chosen for several reasons. The structural formula of some of the hydrocarbons (dicyclopentadiene) is not fully known. Also, the specific gravity of the various hydrocarbons differs enough to give serious consideration to the difference between the volumes of each. Absorption of the hydrocarbons by the polymers occurs very rapidly and, therefore, changes in the volume of each hydrocarbon per given weight will be reflected in the amount of total particle surface which can be wetted prior to absorption. Because of these considerations it was felt that the use of the straight weight basis would be adequate.

The ground polymer scraps were subjected to screen analysis. Particles which were too large to pass through an opening of 10 mm (about ⅜ mesh screen) were rejected as well as those which would pass through an opening of 1.18 mm (16 mesh U. S. Standard). Fig. 2 shows the particle size distribution of both polymer scraps. The choice for the sizing was guided by practical as well as theoretical considerations. The sizing range is well within practical grinding operations of the reclaiming process. However, simple calculations have shown that the increase in total surface area of the particles becomes very large below a particle radius of 0.59 mm.

* Coumarone occurs in small amounts only and could not be obtained. Therefore, experiments with this hydrocarbon could not be carried out.

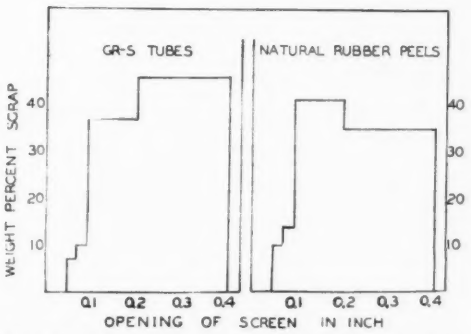

FIG. 2—Particle size distribution of polymer scraps

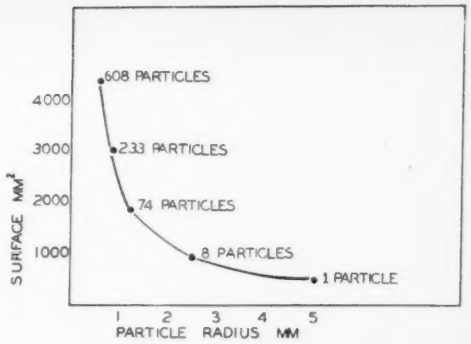

FIG. 3—Total surface area increase obtainable at specific sizing ranges by comminution from a given volume of polymer.

Assuming the ground particles to be spheres, the number of particles and their total surface area which can be produced by comminution of one particle of an average diameter of 10 mm was calculated. Out of such a particle, eight particles can be produced which will pass a 3/16-inch mesh screen, seventy-four which will pass an 8 mesh screen (U. S. Standard), two hundred and thirty-three which will pass a 12 mesh screen, and six hundred and eight which will have the diameter of the 16 mesh screen. Fig. 3 shows the total surface area increase which can be obtained at these sizing ranges by comminution from a given volume of polymer. Undoubtedly the actual total surface area of each ground vulcanized polymer will differ from these figures calculated for the 5 sizing range points. However, inasmuch as we were concerned with the principal of the surface area increase only it was felt that more integrated calculations would not add to the value of the present investigation, particularly since the ground particles actually are not of spherical shape.

The tremendous increase in the total surface area of particles having a radius below 0.59 mm was the reason for the decision to discard any particles below 16 mesh so that more uniform and reproducible results could be obtained. Fig. 2 shows that only a small percentage of particles between 8 and 12 and between 12 and 16 mesh are present. The total surface area of the ground GR-S scrap can be considered fairly close to that of the ground natural rubber peel scrap. It must, of course, be realized that the ground particles are not actually of spherical shape. Grinding will be accomplished by a combination of cutting, tearing and crushing depending on the surface of the rolls, the compounding ingredients of the vulcanized polymers, and the kind of polymer present. (Because of the difference between the structure of GR-S and natural rubber it can be expected that the former will grind differently from the latter.) However, regardless of whatever particle shape will occur, the general considerations about surface increase and particle size will hold true and would even be exaggerated the more the particle shape differed from that of a sphere.

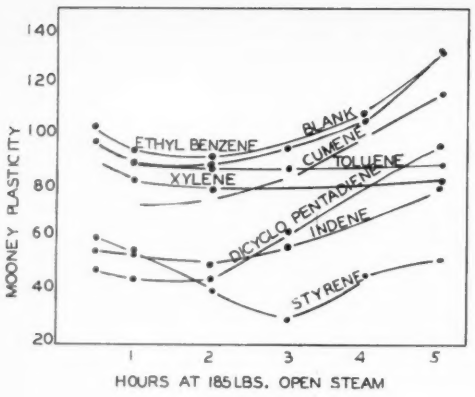

FIG. 4—Effect of various hydrocarbons on the plasticity of natural rubber peels.

Experimental Procedure

The various individual hydrocarbon components of coal tar naphtha were each thoroughly mixed with the scrap prior to open steam treatment. These included the following:

Toluene: c. p. grade; B.P., 110.5° C.; Sp. Gr., 0.866 (20/4° C.).
o, m, p Xylene: c. p. grade; B.P. range, 137°-141° C.; Sp. Gr., 0.858 (29° C.).
p Xylene: c. p. grade; B.P., 138.5° C.; Sp. Gr., 0.861 (20/4° C.).
Mesitylene: Eastman grade; B.P. range, 163°-166° C.; Sp. Gr., 0.863 (20° C.).
Indene: 90% purity; B.P. range, 180°-182° C.; Sp. Gr., 0.989 (25° C.); I_2 no., 207.
Dicyclopentadiene: 90% purity; B.P. range, 43°-45° C./5 mm Hg.; Sp. Gr., 0.964 (26° C.); I_2 no., 244.
Ethylbenzene: A.C.S. Spec. grade; B.P. range, 135°-137° C.; Sp. Gr., 0.870 (20° C.).
Styrene: 99.7% pure; B.P., 144° C.; Sp. Gr., 0.908 (20° C.).
Cumene: 95% pure; B.P. range, 147°-155° C.; Sp. Gr., 0.859 (20° C.).

15 parts of each of the oils were added to the GR-S scrap and 5 parts of each to the natural rubber scrap. These proportions were chosen to provide reclaims which would exhibit a Mooney plasticity range of reasonable accuracy and proper mill workability to permit adequate judgment. No other oils or mill additives were added so as not to obscure the effect of the reclaiming oils. The scrap which had been thoroughly mixed with the reclaiming oil was loaded into square containers in layers of 2-inch height and subjected to open steam (185 lbs. gauge pressure/194° C.) from ½ to 5 hours. After removal from the autoclave the mass was given 15 passes through an open mill and then subjected to milling under high friction (refining).

Each reclaim was rated by its plasticity, coherence of the sheet coming from the refiner rolls, and tack. While the plasticity of a reclaim is of importance, plasticity measurements alone do not describe the reclaiming effectiveness of a reclaiming agent, but must be combined with an evaluation of the coherence of the reclaim sheet and also its tack. So far no adequate means of measuring the coherence of the reclaim sheet have been developed. Possibly the tensile product of the unvulcanized paper thin sheet of reclaim as it is delivered from the refiner would be an adequate measure (note later discussion). However, it would not be a practical measure which could be carried out for control purposes. Therefore, in evaluating the reclaiming effectiveness of each hydrocarbon the coherence was measured by observation whether the sheet strength was adequate to withstand the pull exerted by a windup roll driven at a constant speed. (The surface speed of the windup roll was one-half of that of the refiner roll.) Reclaiming was not considered to have occurred unless at least both plasticity and sheet coherence were obtained.

Plasticity determinations were carried out in a Mooney Plastometer *(7)*, large rotor, at 212° F. The reading was taken after 3 minutes. Each reclaim was given 24 hours of rest between the refining operation and preparation for plasticity measurements. The preparation for the plasticity determination consisted in a 3 min. milling on a 6 x 12-inch laboratory mill (0.040-in. lead setting, 400 g. batch). Shrinkage of the milled sheet was determined whenever possible. (Some reclaims which did not possess sheet coherence also would not knit together properly on the mill rolls to permit shrinkage measurements; others were too soft and tacky to be removed from the rolls without deformation.) Fig. 4 shows the results obtained. In each case a blank experi-

TABLE III—HEAT HARDENING OF GR-S

Time of Reclaiming Interval	Grams Stress at 200% Elongation	
	Indene	Dicyclopentadiene
½ hour at 185 pounds.....	70	90
1 hour at 185 pounds.....	65	80
2 hours at 185 pounds.....	75	85
3 hours at 185 pounds.....	80	110
4 hours at 185 pounds.....	Broke at 170%	Broke at 150%
5 hours at 185 pounds.....	Broke at 150%	Broke at 120%

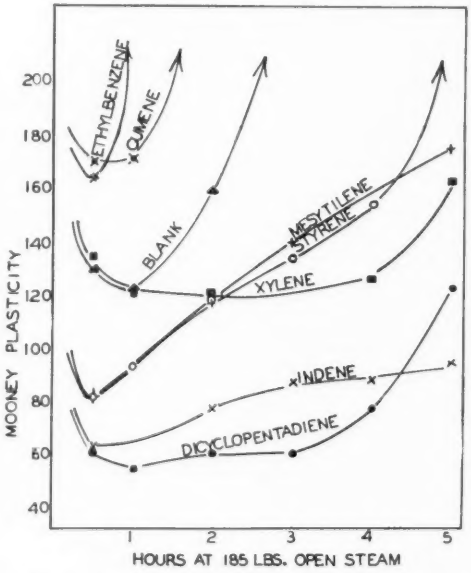

FIG. 5—Effect of various hydrocarbons on the plasticity of GR-S tubes.

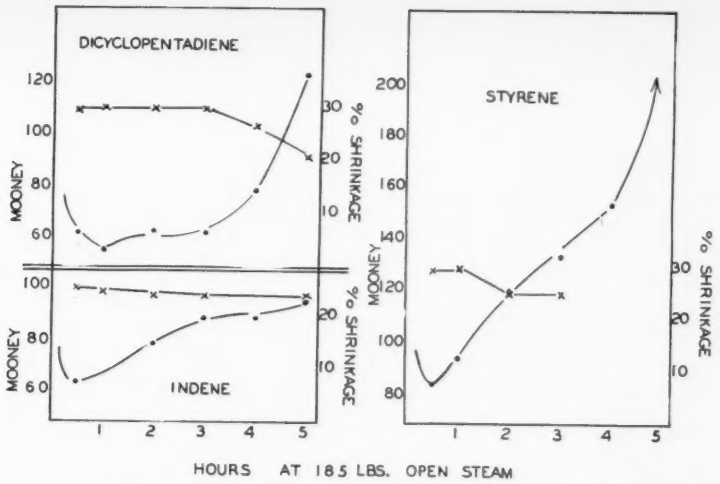

FIG. 6—Comparison of shrinkage data and Mooney plasticity on reclaims prepared from indene, dicyclopentadiene and styrene.

x—represents shrinkage curve; ●—represents Mooney plasticity curve

ment which did not contain any kind of reclaiming oil was run for comparison.

Examination of Results

Blank Run: It can be seen that the natural rubber peelings are fairly stable in their plasticity over the range of heat treatment investigated. The sheet coming from the refiner, however, had neither coherence nor tack.

Of all the hydrocarbons investigated only styrene, indene and dicyclopentadiene caused any appreciable increase in plasticity over and above the blank run. Reclaims prepared by the addition of each of these three hydrocarbons also show sheet coherence and tack over the whole period of heating intervals investigated. Some difference, however, can be noted in their heat stability, dicyclopentadiene producing the least stable reclaim and indene the most stable one.

None of the reclaims prepared from any of the other hydrocarbons showed any sheet coherence or tack even though some increase in plasticity over and above the blank was obtained. It is interesting to note that the use of ethylbenzene did not even result in any increase in plasticity. The molecular weights of ethylbenzene and styrene are only two hydrogen atoms apart so that a comparison of the reclaiming activity of these two hydrocarbons becomes even more interesting. Also, the specific gravity of ethylbenzene is less than that of styrene which would tend to shift the balance of the optimum experimental conditions toward the former for reasons previously discussed.

Fig. 5 shows the results obtained by the addition of the same hydrocarbon compounds to the vulcanized GR-S scrap. Again a blank experiment, where no hydrocarbon was added, was run at the same time. It shows the great progress of heat hardening which has been previously described *(5, 6)*. After two hours of heat treatment the vulcanized GR-S polymer had hardened to such an extent that it was impossible to take any plasticity readings. However, even at ½ hour and 1 hour heating intervals, where plasticity readings could be obtained, the sheet possessed neither coherence nor tack.

The same hydrocarbons which caused an appreciable increase in the plasticity during the reclaiming of the vulcanized natural rubber polymer show this effect during the reclaiming of the vulcanized GR-S polymer. However, the predominance of the heat hardening effect occurring in GR-S changes the results. GR-S reclaims prepared by the addition of styrene showed sheet coherence only up to 2 hours of reclaiming interval and heat hardening appears very pronounced. The addition of dicyclopentadiene and indene resulted in reclaims which showed sheet coherence over all the heating intervals investigated, yet again dicyclopentadiene produces a less stable reclaim than indene. Ethylbenzene and cumene actually decrease the plasticity of the reclaim, while xylene appears to retard the heat hardening but does not increase the plasticity over and above that of the blank. Mesitylene causes a considerable increase in plasticity during short reclaiming intervals followed by pronounced heat hardening. Its plasticity curve is almost identical with that of styrene; however, sheet coherence does not even occur at short reclaiming intervals. Neither ethylbenzene, cumene or xylene show any sheet coherence of the respective reclaims at any reclaiming interval.

To obtain some measurement of the coherence of these sheets and the progress of heat hardening of the polymer, samples in the form of bars (0.004-in. thick, 0.25-in. wide) were cut from the individual refiner sheets and subjected to stress-strain determination on a Scott Incline Plane tensile testing machine under a constant load of 250 g. These determinations could be carried out for the GR-S reclaims made by the addition of indene and dicyclopentadiene (Table III). Attempts to determine the coherence of the refiner sheets of the reclaim prepared by the addition of styrene failed because the elongation of these sheets even at the short periods of reclaiming intervals did not reach 200%.

(It was felt that under the conditions of the experiment the experimental error incurred below an elongation of 200% would be too great to permit conclusions to be drawn from such data.) A greater increase in modulus and decrease in elongation with time of reclaiming can be noticed in the reclaim sheet which was obtained from dicyclopentadiene than in that obtained from indene which in general confirms the previous observation on heat hardening made from the plasticity measurements of the two reclaims.

It was possible to obtain shrinkage data on the reclaims prepared from indene, dicyclopentadiene and styrene. In Fig. 6 these data are compared with the Mooney plasticity readings obtained from each reclaim. A decrease in the shrinkage can be noticed when the Mooney plasticity readings indicate the occurrence of heat hardening of the GR-S. This could be expected with an increase in the crosslinking of the GR-S polymer. Again, indene produces a more stable reclaim than any one of the other two oils.

Plasticizing versus Reclaiming Action

It seemed of interest to compare the plasticizing effect which these oils might exert on the crude unvulcanized polymers with their reclaiming action on the vulcanized polymers. Inasmuch as gel formation has been noticed to occur during the milling of GR-S *(8)* and inasmuch as crude natural rubber would in general be more amenable to plasticization than the unvulcanized synthetic rubber, the following experiments were carried out with unvulcanized natural rubber:

1A ribbed smoked sheet was milled on a cold mill (100° F.) for 6 minutes (opening 0.040-in., batch size 400 g.) while 5 parts of the respective oil per 100 parts of rubber were incorporated. After batching off, a 5 hour rest period was permitted before Mooney plasticity readings (3 min., large rotor) were taken. The plasticity readings on the unvulcanized polymer-hydrocarbon mix had to be taken at a lower temperature (150° F.) than those of the reclaims because of the nature of the unvulcanized polymer. However, in each case a blank which did not contain any oil addition, but was milled for the same length of time, was run at the same time so that comparisons in regard to the effectiveness of each oil as plasticizer or reclaiming agent could be made with respect to the blank. Acetone extracts *(2)* of the crude rubber and its mixes with hydrocarbons were made to determine how much of the oils which had been milled into the rubber remained therein because some loss due to evaporation could be expected to occur during milling, which would affect the plasticity of the mix.

The experimental data obtained are recorded in Table IV. The acetone extracts show that the loss in hydrocarbons sustained by evaporation during milling is quite alike for all three oils investigated and within the range of experimental error and that, therefore, comparative considerations between the four mixes are justified. The Mooney plasticity readings show that dicyclopentadiene, whose reclaiming effect on both the natural and synthetic vulcanized polymers is considerable, cannot be considered a plasticizer for crude natural rubber. Ethylbenzene, as well as styrene, plasticize the crude natural rubber to the same degree, whereas, as was shown above, ethylbenzene does not exert any reclaiming effect on the vulcanized natural rubber and does not even plasticize it at the high temperatures used during the reclaiming process. (See Mooney plasticity readings.)

If those hydrocarbons contained in coal tar naphtha which showed reclaiming capacity are compared, it can be seen that they are unsaturated compounds (indene, styrene, dicyclopentadiene), and while the effect of each of these may be somewhat different with respect to vulcanized GR-S and vulcanized natural rubber they still cause the greatest increase in the plasticity of the reclaim and are the only hydrocarbons which at least at one or more time intervals of reclaiming produce a coherent sheet. The effects are naturally more pronounced for vulcanized natural rubber where chain scission has been found to predominate and to occur more easily (methyl group substitution on the α-carbon atom) than for GR-S where the simultaneous occurrence of heat hardening tends to obscure the picture.

TABLE IV

Polymer	Milling	Mooney Plasticity 150° F.	Mooney Plasticity 212° F.	Acetone Extract
1A Smoked sheet	6 mins.	48	—	3.0%
1A Smoked sheet milled with 5 parts dicyclopentadiene	6 mins.	47	—	7.4%
1A Smoked sheet milled with 5 parts ethylbenzene	6 mins.	41	—	7.5%
1A Smoked sheet milled with 5 parts styrene	6 mins.	41	—	7.4%
Vulcanized natural rubber peels (2 hrs./185 lbs. steam)	Refined	—	92	8.7%
Vulcanized natural rubber peels with 5 parts dicyclopentadiene (2 hrs./185 lbs. steam) (reclaim treatment)	Refined	—	46	9.2%
Vulcanized natural rubber peels with 5 parts ethylbenzene (2 hrs./185 lbs. steam) (reclaim treatment)	Refined	—	93	10.2%
Vulcanized natural rubber peels with 5 parts styrene (2 hrs./185 lbs. steam) (reclaim treatment)	Refined	—	40	9.9%

Influence of Oxygen

One property is held in common by indene, dicyclopentadiene and styrene. All three show rapid take-up of oxygen from air and autoxidation. For example, an indene preparation containing 2.45% of oxygen was found to contain 13.5% after 8 weeks storage *(18)*. If cyclopentadiene is shaken with air, dicyclopentadiene peroxide is formed *(12)*. Dicyclopentadiene also was found to react spontaneously with oxygen forming peroxide *(17)*. The reactivity of styrene with oxygen has also been known and investigated *(4, 10)* for some time.

Unfortunately, the great capacity of oxygen absorption and peroxide formation of these hydrocarbons prior to their actual use as well as the peroxidic breakdown and crosslinking reactions which have occurred in the vulcanized polymers during their initial use *(1, 16)* will not permit experimental reclaiming conditions where the influence of oxygen can be excluded. It is to be understood that it would of course be possible to apparently provide such experimental conditions where no additional oxygen would be introduced into the system. However, it is impossible to free the vulcanized polymers as well as the reclaiming agent from oxygen reaction products inherent to them. Furthermore, it must be kept in mind that such reactions were found to occur at extremely low oxygen concentrations *(1, 16)*.

If it is assumed that the reactivity toward oxygen is

responsible for the behavior of these hydrocarbons during the reclaiming process the question naturally arises as to why such hydrocarbons as mesitylene, toluene and xylene appear to exert at least some plasticizing effect on the reclaim. Toluene and xylene are usually considered stable hydrocarbon compounds. However, previous investigators have shown that they are susceptible to autoxidation even if to a lesser degree than indene, dicyclopentadiene or styrene. Inasmuch as these saturated hydrocarbon compounds showed some effect on the plasticity of the vulcanized polymer during the reclaiming process it seemed of interest to determine whether this effect would also follow in size the susceptibility of these hydrocarbons to autoxidation.

This susceptibility to autoxidation had been found to be connected with the number of substitutional groups on the benzene ring and with their relative position *(13)*. It had been found that while benzene was almost immune to autoxidation its substituted homologues became the more susceptible the greater the number of substitutional groups *(3, 14)*. Thus, xylene was more susceptible to autoxidation than toluene. However, the number of the substitutional groups was not the only determining factor; their position was equally determining. Ortho xylene was found to be least susceptive to peroxide formation while para xylene was most susceptive; a mixture of o, m and p xylene varied according to composition *(13)*.

Reclaiming experiments were carried out using toluene, xylene (mixture of o, m and para) and pure para xylene and the plasticity of the reclaims was determined (Fig. 7). It should be remembered that neither xylene or toluene had been found to be adequate reclaiming agents in previous experiments and no change in this situation could be expected. However, a small increase in the plasticity could be expected to occur from toluene to the mixture of o, m and p xylene and from that to the pure p xylene if the susceptibility to peroxide formation of these hydrocarbons was responsible for the plasticizing reaction. As can be seen from Fig. 7, the sequence of the three plasticity curves conforms exactly to the ease of peroxide formation *(3, 17)* of the respective hydrocarbons.

No data are available in the literature on the autoxidation of cumene or mesitylene. However, if the rule that increased substitution on the benzene ring increases susceptibility to autoxidation holds true, an increase in plasticity over and above xylene should be expected when mesitylene is used as reclaiming agent. Fig. 5 shows that this was actually obtained on GR-S for short reclaiming intervals before heat hardening of the polymer became predominant. Ethylbenzene has been described in the literature *(3)* as a compound which is very stable toward autoxidation. Reclaiming experiments on vulcanized GR-S and natural rubber have shown that it does not increase the plasticity.

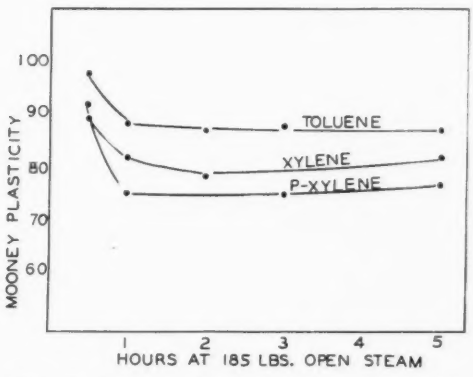

FIG. 7—Plasticity of natural rubber peel reclaims prepared from toluene, xylene and p-xylene.

TABLE V

Polymer	Milling	Mooney Plasticity 150° F.	212° F.	Acetone Extract
1A Smoked sheet milled..	5 mins.	55	—	2.9%
1A Smoked sheet milled with 3 parts fresh indene	5 mins.	49	—	5.4%
1A Smoked sheet milled with 3 parts polymerized indene	5 mins.	50	—	5.5%
Mixed vulcanized natural rubber and GR-S peels reclaimed 9 hrs./185 lbs. with 3 parts fresh indene	Refined	—	106	12.5%
Mixed vulcanized natural rubber and GR-S peels reclaimed 9 hrs./185 lbs. with 3 parts polymerized indene	Refined	—	128	12.6%

Finally, to show the connection of the reclaiming effectiveness with certain active chemical groups within a hydrocarbon, indene was polymerized at room temperature (no catalyst addition) until its viscosity amounted to 230 Poises $^{25°C}$ and its iodine number had decreased to 88. Reclaiming of mixed vulcanized natural rubber and GR-S peels with 3% of the polymerized indene was then carried out in a digester over a period of 9 hours at 185 pounds steam pressure and in the presence of an 0.2% metal chloride solution. An identical experiment was run, but fresh (not polymerized) indene was used. The reclaim prepared by the addition of the polymerized indene had no sheet coherence and no tack and a lower plasticity whereas the reclaim prepared by the addition of fresh (not polymerized) indene exhibited all criteria of proper reclaiming. At the same time the acetone extracts of both are practically identical (Table V).

These two indene preparations were also added to unvulcanized natural rubber on the mill (3 parts per 100 parts of rubber) in the manner previously described. Again the acetone extract of the original smoked sheet was determined to be able to check whether any oil loss had occurred on the mill (Table V). The oil loss observed for the mixture of crude rubber and polymerized indene was very close to that observed for the mixture of crude rubber and fresh indene. An increase in plasticity can be observed; however, the Mooney plasticity readings can be considered identical for both.

Thus, again the plasticizing effect exerted by a hydrocarbon on crude natural rubber cannot be taken as an indication of its reclaiming effectiveness. Indeed, the plasticity data obtained from the crude rubber-indene mix do not indicate that indene should be considered an effective plasticizer for crude natural rubber. Furthermore, if the number of active groups within the hydrocarbon are decreased—such as occurs during polymerization—the reclaiming effectiveness of that hydrocarbon on the vulcanized polymer, but not its plasticizing effectiveness on the crude polymer, is decreased.

Summary

The various hydrocarbons present in coal tar naphtha were studied for their reclaiming effectiveness. The reclaiming effectiveness was found to follow the autoxidative susceptibility (peroxide formation) of the individual hydrocarbon. While this reaction appears to favor a plasticity increase in the reclaimed polymer it cannot be decided as yet whether it is also responsible for the sheet coherence of the reclaim.

No connection was found between the plasticizing effect of a given hydrocarbon on the crude natural rubber polymer and its reclaiming effect on the vulcanized natural rubber polymer.

It should not be concluded that all reclaiming agents necessarily follow the same reactions. Even within the hydrocarbon group studied differences with respect to heat hardening of the synthetic polymer were noticed which cannot be explained on the basis of the available information.

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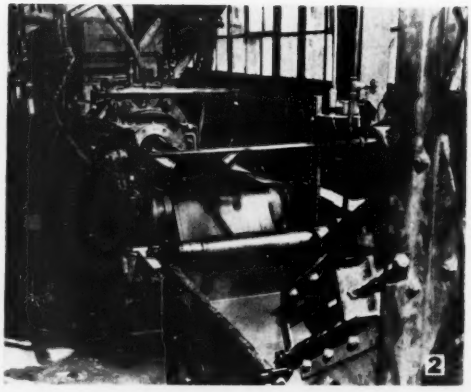
Electric Auto-Lite Utilizing Unique Wire Plant Installation

AN improved method of preparing rubber for wire insulation, said to be the first installation of its kind in the country, is now in operation at the Port Huron, Mich., plant of the Electric Auto-Lite Co. A new strainer-extruder unit is utilized while a series of conveyors eliminates handling of the heavy rubber batches prepared by the mixer. The strainer-extruder unit was manufactured for the Auto-Lite Wire and Cable Division by Farrel-Birmingham, Inc., Ansonia, Conn.

The first of the photographs shows the mixer at left and the conveyor system which carries the batches of rubber to the strainer-extruder at right.

In the second photograph, the rubber is seen emerging from the strainer-extruder into a cooling and lubricating bath.

The third photograph depicts the manner in which the sheeted rubber travels up a chain conveyor for further cooling and then to a rotary knife where it is automatically cut to size and palleted for easy handling.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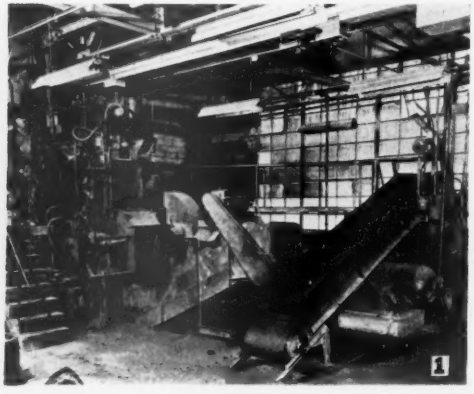
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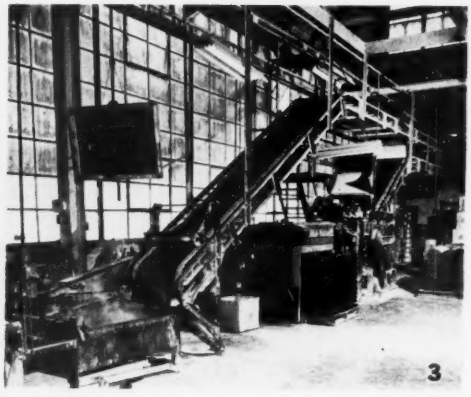
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Cyclized Rubber as a Reinforcing Filler

By G. J. van VEERSEN and B. B. S. T. BOONSTRA

Rubber Stichting, Delft, Holland

IN the technology of rubber the effect of fillers on the mechanical properties of vulcanizates is an extensively studied subject. Numerous communications have been published in which the mechanical properties of vulcanizates containing all kind of blacks, barytes, clays, whitings, etc., have been described. Of considerable interest for our work was the publication of Thies *(1)*, who investigated the effect of cyclized rubber (Pliolite) as a filler. By determining the mechanical properties of vulcanizates containing increasing amounts of cyclized rubber, he could show that tensile strength, elongation and resilience decreased, whereas hardness, stiffness and abrasion resistance increased.

In that paper the author points to the fact that the mixing of cyclized rubber and rubber on the mill is a highly time- and energy-consuming procedure because the cyclized rubber has to be put on the mill first and the rubber has to be added in small portions after the resin runs smoothly and forms a bank. Masticating cyclo-rubber consumes about five times as much energy as the processing of natural rubber. Apart from the costs of cyclized rubber, it is probably mainly this technical fact which impeded the practical application of cyclized rubber as a filler.

During the war the production of cyclized rubber was discontinued due to the shortage of natural rubber. Pliolite copolymers of styrene and butadiene with a high styrene content were produced instead and marketed under the names of Pliolite S-3, S-6, etc. *(2)*. These products can be incorporated into rubber in the customary way in the Banbury in cases when a hard rubber is desired and the composition also contains considerable amounts of filler. They have nearly the same effect on the mechanical properties of rubber vulcanizates as cyclized rubber. The work of Thies and Aiken *(2)* shows

Note: This article is Communication No. 136 of the Rubber Stitching, Delft, Holland.

TABLE I—THE MECHANICAL PROPERTIES OF VULCANIZED SHEETS FROM LATEX WITH INCREASING AMOUNTS OF CYCLIZED RUBBER

(Test Method: Dumbbells, 1 x 3.2 mm.)

Ratio cyclized rubber to rubber (in weight)	0/10	1/9	2/8	3/7	4/6	5/5
Curing time (min.)	60	75	75	75	75	75
Tensile strength (kg/sq. cm.)	399	276	214	173	103	74
Elongation at break (%)	995	830	650	545	408	270
Modulus 300% (kg/sq. cm.)	6	13	32	55	66	—
Shore hardness A	31	40	51	58	72	87
Shore elasticity	80	75	82	42	24	21
Permanent set 24 hrs. at 200% at 20° C. (measured 24 hrs. after release)	3.5	9.5	5.5	41	74	61

that the tensile properties are only affected by higher amounts of resin but tear strength and elongation drop rather sharply even when small amounts of resin are added.

The troubles encountered in mixing rubber and cyclized rubber can be entirely overcome when cyclized rubber is made according to a new method developed in our laboratory *(3)*. By cyclizing rubber in latex a finely dispersed latex of cyclized rubber can be easily prepared, which enables us to carry out the mixing of cyclized rubber and rubber in the form of latices.

In this paper it will be shown that rubber vulcanizates can be made from latex which have excellent properties. In addition, a whole score of products can be prepared possessing any desired degree of stiffness. Fur-

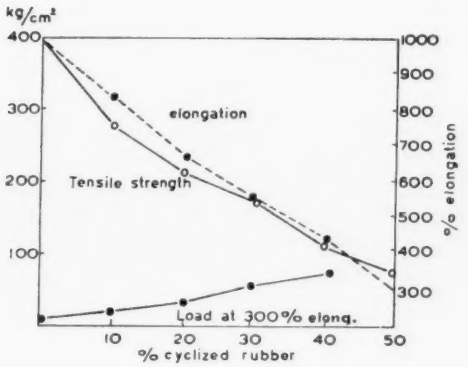

Fig. 1.

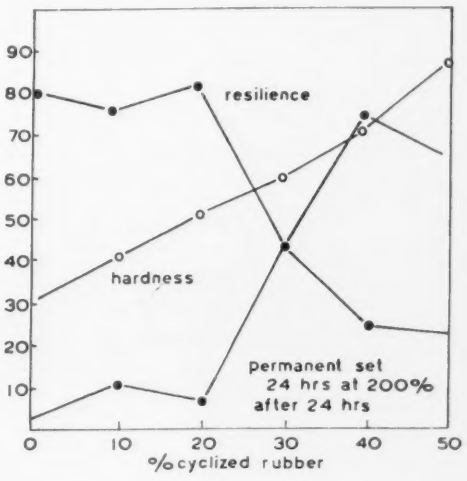

Fig. 2.

thermore, by coagulating or drying the latex mixtures, sheets can be obtained which may be treated and compounded on the mill in an ordinary way. In this way highly resilient and very stiff stocks can be made, contrary to the results with Pliolite.

Tests and Results

The Preparation and Properties of Vulcanizates from Latex with Varying Amounts of Cyclized Rubber: Latices containing increasing amounts of cyclized rubber were made by mixing natural rubber latex (centrifuged, d.r.c. 60%) and a cyclized rubber latex (t.s. 60%). The unsaturation of the cyclized rubber was determined by means of hydrochlorination *(4)* and amounted to 18 (unsaturation of rubber = 100). On 100 rubber, 2 ZnO, 1 Z.D.C. and 2 sulfur were added in aqueous dispersion stabilized with Darvan. Sheets were made on glass plates, dried and cured at 80° C. The mechanical properties are shown in Table I and graphically presented in Figures 1 and 2.

The results show that tensile strength, elongation and resilience decrease, while hardness, stiffness and permanent set increase with higher percentage of cyclized rubber. Attention may be paid to the vulcanizate containing 20% cyclized rubber. Tensile strength is still 214 kg/sq. cm., whereas the Shore hardness is 51 and the resilience and permanent set are relatively good.

Since a mixture of natural rubber and cyclized rubber latex does not differ essentially in behavior from ordinary natural rubber latex, the mixture can be used according to methods of common latex practice; thus, the Kaysam procedure may be applied.

In using cyclized rubber as a filler the disadvantages of the application of mineral fillers are avoided. For example, since the specific gravity of cyclized rubber is near to 1, no settling of the filler is to be feared. By varying the amount of cyclized rubber, latex products can be made with specified properties. A practical suggestion may be the production of latex threads. It is known that rubber threads made from latex have too low a modulus to be worked easily on textile machines. Since mineral fillers cannot be used to stiffen the rubber in this case (low wet strength), it seems advisable to apply cyclized rubber in this instance.

The Preparation and Properties of Vulcanizates Containing Increasing Amounts of Cyclized Rubber, Adding Vulcanizing Agents on the Mill: Dried sheets of rubber containing increasing amounts of cyclized rubber were milled as usual and the following ingredients were incorporated (on 100 rubber-cyclo rubber mixture): 5 zinc oxide; 5 magnesium oxide; 0.8 Altax; 0.5 D.P.G.; 2 aldol-alpha-naphthylamine; 1 stearic acid; 1.75 sulfur. The results are shown in Table II and Figures 3 and 4. The decrease in tensile strength and elongation after seven days oxygen bomb heating at 70° C. (Bierer-Davis) is shown by the following data:

Ratio cyclized rubber to rubber....	0/10	2/8	3/7
Decrease in tensile strength.....	10%	34%	48%
Decrease in elongation at break...	8%	5%	19%

The values shown compare favorably with those for a mixture of the same composition but with 22 vol. % of carbon black instead of cyclo rubber. For EPC types of carbon black the following values were found after one week oxygen bomb heating at 70° C.: Decrease in tensile strength, 65%; in elongation, 38%. By choosing more suitable vulcanization recipes the aging properties may be improved, as the mixture used was chosen for practical reasons only and not as a result of biased investigation.

It was of interest to compare the effect of cyclized rubber applied as described herein with the synthetic substitute mentioned, Pliolite S-6. To this end, the styrene-butadiene copolymer (Pliolite Latex 190) was mixed with natural rubber latex, and this latex treated as described above and vulcanized in the same mix. The ratio in weight of Pliolite S-6 to natural rubber was 1:3 as for cyclized rubber and natural rubber. The mechanical properties of the vulcanizates are shown in Table III.

Heat build-up of the rubber-cyclized rubber, rubber-Pliolite, and rubber-carbon black stocks, as reflected in the Goodrich Flexometer after 30 minutes with 0.175 stroke and 25 kg weight, was as follows:

	Cyclized Rubber	Pliolite	Carbon Black
at 20° C.	21° C.	66° C.	44° C.
at 100° C.	20° C.	22° C.	23° C.

Aging tests (seven days in the Bierer-Davis bomb) on these three stocks showed the following results:

	Cyclized Rubber	Pliolite	Carbon Black
Decrease in tensile strength...	40%	27%	65%
Decrease in elongation at break	10%	5%	38%

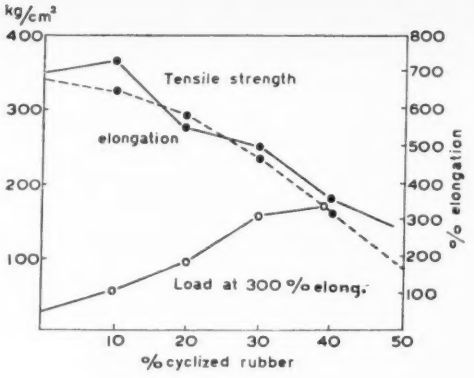

Fig. 3.

TABLE II—MECHANICAL PROPERTIES OF RUBBER-CYCLIZED RUBBER VULCANIZATES

(Vulcanization: 10 min. @ 142° C.)
(Test Method: Dumbbells, 1 x 3.2 mm.)

Ratio cyclized rubber to rubber	0/10	1/9	2/8	2.5/7.5	3/7	4/6	5/5
Tensile strength (kg/sq. cm.)	350	367	286	275	249	173	135
Elongation at break (%)	670	640	560	475	460	310	170
Modulus 300% (kg/sq. cm.)	24	52	89	152	153	170	——
Shore hardness A	36	47	56	60	64	71	89
Shore elasticity	98	90	90	70	73	60	40
Permanent set 24 hrs. at 200% at 20° C. (measured 24 hrs. after release)	1	2.5	4	5	8.5	——	——
Spec. gr.	0.96	1.012	1.017	——	1.028	1.035	1.040
Abrasion, Grasselli (mm³/kgm.)	1.2	1.31	1.32	——	1.61	1.84	1.66
Tear resistance (kg/sq. cm.)	80	46	82	110	116	120	53

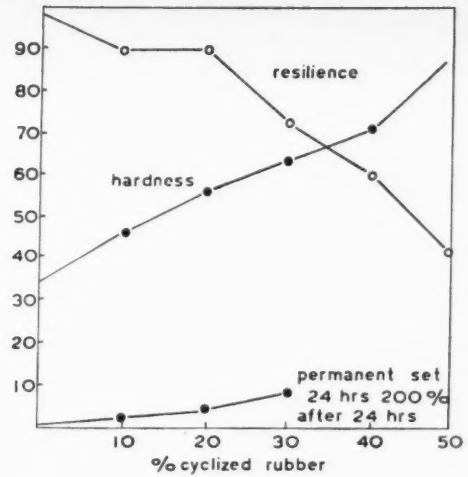

Fig. 1.

TABLE III—MECHANICAL PROPERTIES OF NATURAL RUBBER VULCANIZATES CONTAINING CYCLIZED RUBBER AND PLIOLITE S-6, RESPECTIVELY

(Test Method: Dumbbells, 1 x 3.2 mm.)

Vulcanization	Rubber-Cyclized Rubber (3:1) 10 min. at 142°C.	Rubber-Pliolite (3:1) 10 min. at 142°C.
Tensile strength (kg/sq. cm.)	275	275
Elongation at break (%)	480	540
Tensile strength at 100° C	70-80	116
Elongation at 100° C	470	740
Modulus 300% (kg/sq. cm.)	152	100
Shore hardness A	60	60
Shore elasticity	70	64
Permanent set 24 hrs. at 200% at 20° C. (measured 24 hrs. after release)	5	10
Tear resistance (kg/sq. cm.)	110	56
Atlas-Grasselli (mm² kgm.)	1.5	2.0
Flex-cracking (1000 cycles)	19	25
Cut growth (1000 cycles)	80	58
Brittle point	−54° C.	−56° C.
Lüpke resilience at 20° C	75	65
at 50° C	83	72
at 80° C	83	77
at 100° C	85	60
after cooling again at 20° C	77	69

Discussion

Our results in general agree with those of Thies. Application of cyclized rubber prepared from latex, however, causes much stiffer vulcanizates, probably due to a higher degree of dispersion. Surprising is the high resilience (Lüpke: 75%) of the vulcanizate containing 25 parts of cyclized rubber and 75 parts of natural rubber, where the 300% modulus amounted to 152 kg/sq. cm. Compared with an ordinary tread stock (Lüpke resilience: 51 and 300% modulus about 100 kg/sq. cm.), our cyclo rubber-rubber vulcanizate may be called highly resilient. The combination of high modulus of elasticity and high resilience is the most striking point in our results. The simple way in which highly resilient and still stiff materials can be prepared offers many possibilities for application of these products.

Comparison of the mechanical properties of the vulcanizates containing equal amounts of cyclized rubber and Pliolite S-6 shows some similarity as far as tensile strength, hardness and brittle point are concerned. The stiffness of the cyclized rubber vulcanizate is higher, whereas the Lüpke resilience, contrary to expectations, is superior to the other vulcanizate. The cyclized rubber vulcanizate also has the advantage of a lower heat build-up and a better tear resistance.

Further experiments have determined that the so-called Mullin's effect is low in the cyclized rubber vulcanizate, compared with carbon black stocks. It means that the modulus which is measured by stretching a freshly prepared sample decreases less by repeated stretchings than is the case with carbon black mixes. From Table IV it appears that this effect is specially evident at 100% elongation.

The data in Table IV may indicate that cyclized rubber as a filler either builds up little structure or a very persistent structure. Road tests alone can determine how tires made with cyclized rubber compositions will behave.

It has been shown, however *(5)*, that the cyclized rubber composition possesses a very high coefficient of friction under laboratory conditions, especially on an asphalt surface with rubber powder incorporated in the mix.

Finally, the two following facts have to be considered: (1) The use of cyclized rubber as a filler enables manufacturers to produce end products of practically any color, and (2) The low specific weight of the cyclized rubber vulcanizates is of special importance in the production of airplane tires since they reduce the dead weight.

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(2) Thies, H. R., and Aiken, W. H., Pliolite Copolymer Resins and Their Uses, *R. A. (N. Y.)*, Vol. 61, pp. 51-58 (1947).

(3) Van Veersen, G. J., The Preparation of Cyclized Rubber from Natural Rubber Latex, in press.

(4) Van Veersen, G. J., The Structure of Cyclized Rubber, in press.

(5) Boonstra, B. B. S. T., Method for Determining Friction Coefficients, in press.

TABLE IV—DECREASE IN MODULUS BY REPEATEDLY (THREE TIMES) STRETCHING OF A CYCLO RUBBER AND A CARBON BLACK VULCANIZATE

	Cyclo Rubber Composition						Carbon Black Mix (F.P.C.)					
	M_{100} kg/cm²	Δ %	M_{200} kg/cm²	Δ %	M_{400} kg/cm²	Δ %	M_{100} kg/cm²	Δ %	M_{200} kg/cm²	Δ %	M_{400} kg/cm²	Δ %
1st cycle	28		—	—	—	—	19		—	—	—	—
3rd cycle	25	11	—	—	—	—	15	21	—	—	—	—
1st cycle	—	—	65		—	—	—	—	40		—	—
3rd cycle	—	—	46	29	—	—	—	—	27	33	—	—
1st cycle	—	—	—	—	168		—	—	—	—	115	
3rd cycle	—	—	—	—	88	48	—	—	—	—	58	50

Additional Reports of Avoidable Accidents

SEVERAL additional reports of avoidable accidents in rubber manufacturing plants are reproduced below. These instances are reported from time to time in the "Rubber Safety Newsletter" issued by the Rubber Section of the National Safety Council. Careful attention to the causes of these accidents will serve to eliminate them in most plants.

Belt Conveyors: Two near-serious accidents involving belt conveyors have occurred in recent weeks. In one case, an oiler caught his hand between the belt and a take-up pulley when he attempted to oil the pulley with the conveyor in motion. A loose sleeve on the oiler's shirt caught first and pulled his hand in. In the second case, a mill man caught his hand between the belt and the pulley on a strip conveyor. He claimed that his glove was loose on his hand, and that when he put his hand above his head to get his glove on, his hand was pulled into the bite on the conveyor.

These two accidents show the necessity of enclosing all bites between conveyor belts and pulleys. Extensions should be provided to locations outside the guards for oiling. In addition, it is desirable to have emergency safety cables along the length of the conveyor. Survey all departments to see that the necessary safeguards are provided on belt conveyors. In addition, see that workers wear safe clothing. Loose sleeves have no place around moving machinery.

Wire Brushes: Perhaps a traumatic cataract is something new to you, and it is certain that it is not talked about very often because it does not occur very often. Ordinary cataracts come on gradually. A traumatic cataract is caused by a blow and comes on in a few hours.

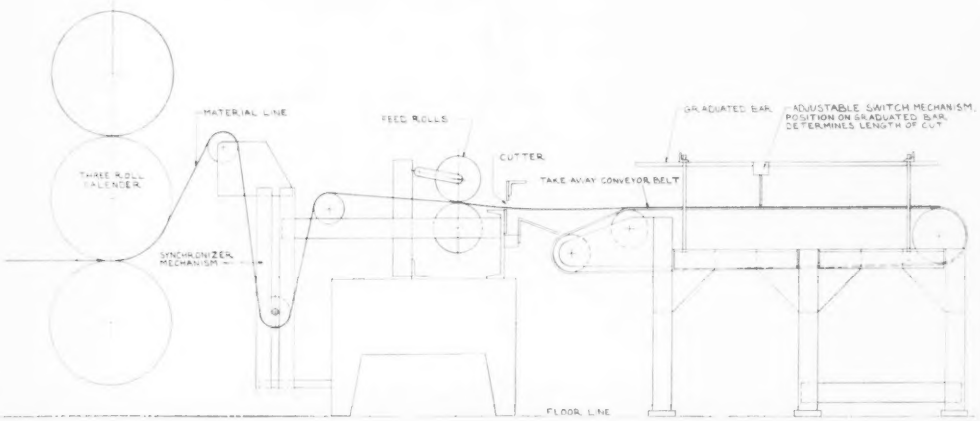
A traumatic cataract occurred last year at a rubber plant, and came on quickly once the damage was done. An employee was using a flexible shaft on the end of which was a revolving wire brush approximately 6 inches in diameter. His job was that of buffing white sidewalls on passenger car casings. Suddenly one of the wire bristles flew like a quill from a porcupine and penetrated the eyeball. The employee's first reaction was to reach up and pull the bristle out. He then reported to first aid.

In the meantime, fluid had leaked onto the surface of the eyeball and in a short time caused a cataract. This cataract was soon removed, and he was provided with a pair of glasses equipped with one cataract lens. A percentage of vision is present. This employee maintains that he was wearing a face shield at the time of injury. He probably was wearing one but it is felt that for such an accident to happen, he must have had the face piece swung up.

Wearing of Rings: Within recent weeks the medical department of a rubber plant called attention to some four or five accidents in which employees have been injured because they were wearing finger rings. Two cases involved electrical shock when the rings came in contact with live parts, and the other accidents occurred when the ring became caught and severely lacerated the finger. Rings are not safe around machinery or electrical equipment. Remind your employees of this point.

Spadone Automatic Stock Cutter

A new type of automatic stock cutter, said to present a flexible and highly satisfactory solution to the problem of accurately cutting materials to length as they feed directly from a rubber calender or other processing equipment, has been developed by the Spadone Machine Co., 10 East 43rd St., New York 17, N. Y. Developed to meet a wide range of cutting problems in the rubber, plastic and textile fields, the unit can also be set up for continuous feed from individual rolls. The unit is fully contained and complete with motor, variable speed control, synchronizer and take-away conveyor. It is quickly and easily adjusted to varying material speeds and infinite lengths of cut within a given range. Resetting for change of required length is simply accomplished and enables the operator to compensate for any constant stretch or shrinkage in the material. The self-honing knife action requires only a minimum of sharpening.



Electric Braking for Rubber Mills and Calenders

By B. J. DALTON

Application Engineer, Industrial Engineering Divisions, General Electric Co., Schenectady, N. Y.

THE operating hazard of open roll mills, crackers and refiners, as well as calenders which are used in processing rubber, plastics and other compounds, has long been recognized. Since 1920 numerous papers have been published concerning electric braking for these machines. Therefore, this subject is not new. The currently renewed interest in safety codes for rubber mills and calenders, however, makes it desirable at this time to review, in terms of present day equipment, the factors which influence stopping.

In looking at a rubber mill or a calender for the first time, one is impressed by its massiveness — Chaffee's original calender was nicknamed the "monster." Yet for all this size and weight the kinetic energy stored in the rolls, gears and couplings at the conventional speeds of today is a small fraction of that stored in the rotor of the driving motor. Although the exact proportions will vary with individual drives, it is probably adequate in most cases to add a rough figure of 15 percent to the motor Wk^2 to include the machine and gear Wk^2. However, the effect of the stored energy of the entire driven machine will be neglected in this discussion; likewise friction, which has an offsetting effect, will also be neglected.

With these factors neglected, stopping of the rolls therefore resolves itself into the problem of stopping the driving motor itself. Fortunately, electric motors provide a simple, inexpensive, reliable, and consistent means of doing this job. It is of interest to note that since the rolls and gears have such a relatively low Wk^2 the shock on the gears during stopping is small. The load transmitted through the gears in stopping will certainly never exceed 100 percent of their rating with any conventional electric braking system.

Note: This article is based on a paper delivered by the author at the Conference on Electrical Engineering Problems in the Rubber and Plastics Industry, sponsored by the American Institute of Electrical Engineers, held in Akron, Ohio, April 20, 1948.

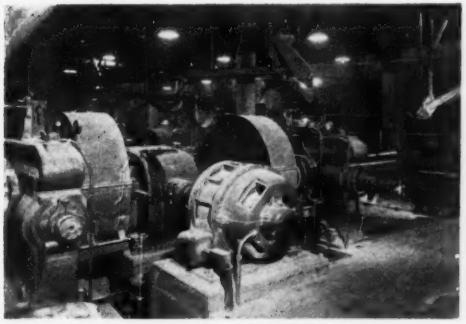


FIG. 1—View of two rubber mills and 300 hp, 720 rpm synchronous driving motor.

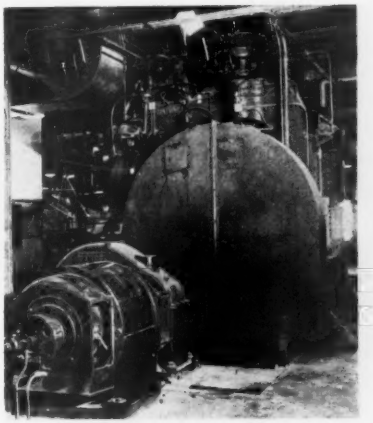


FIG. 2—View of four-roll rubber calender and 200 hp, 575/1150 rpm, d-c driving motor.

Since the motor is of prime concern in stopping the rolls, it may appear that the best solution is to mechanically disconnect the motor from the machine. It is beyond the scope of this paper to discuss the merits of such a scheme or its associated braking problems. Let it suffice to say here that such systems were used before the advent of electric braking and have to a large degree been replaced by electric braking systems.

General Factors Influencing Stopping

The total distance traveled by the rolls in any stopping cycle is governed by two independent factors: (1) The elapsed time between the operation of the safety switch and the establishment of the braking circuit; (2) The number of revolutions to stop the motor after braking power is applied. During the first interval the motor and consequently the rolls are running at top speed. Therefore it is important that this time be short. This item will be discussed in more detail later.

The number of revolutions required to stop a motor after braking power is applied is entirely dependent on the ratio between the kinetic energy stored in the rotor and the rate at which that energy can be dissipated. These in turn are dependent on the type and rating of the motor and the braking system used.

Stopping distances are often expressed in inches of roll travel, but since roll speeds vary widely between machines a stopping distance applying to one machine does not necessarily apply to another. Sometimes stopping distances are expressed in terms of motor revolutions, but this is meaningless unless the rated speed is also specified. In order to provide a common basis on

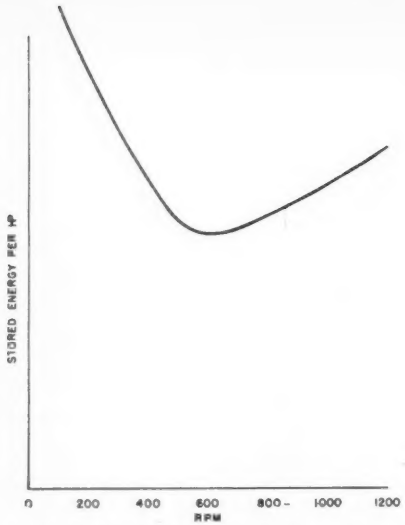


FIG. 3—Relationship between stored energy per horsepower and motor speed for synchronous motors shows optimum speed for quick stopping of rubber mill.

which all types of drives and all speeds can be compared, all stopping performance data in this discussion are expressed in percent of rated movement per minute. If reference is to the motor, the number of revolutions to stop will be expressed as a percent of the rated maximum number of revolutions per minute. If reference is to roll travel, the number of inches travel to stop will be expressed as a percent of the rated or maximum number of inches travel per minute. Let us assume, for example, that a drive having a surface speed of 1200 inches per minute and a motor speed of 600 rpm stops in one percent distance. One percent is thus equivalent to 12 inches travel on the roll or 6 revolutions of the motor shaft.

Mills—Synchronous Motors

Synchronous motors are widely used to drive open roll mills (Fig. 1) and are well suited to this application because of their inherently constant speed and power factor correcting ability; also, they provide in general the most effective electrical means of stopping these machines. Dynamic braking—the usual method of stopping a synchronous motor—is accomplished by disconnecting the motor stator windings from the line and reconnecting them across a resistor network. Field excitation is maintained and the motor acts as a synchronous generator and transfers the energy of rotation into the resistor where it is dissipated as heat.

Since the amount of kinetic energy stored in a motor materially affects its stopping performance, it is desirable that it be as low as possible, but the total amount of stored energy cannot be used as a guide because it is related to horsepower rating. A factor which can be used as a figure of merit in analyzing stopping performance, however, is the ratio of stored energy to horsepower. Fig. 3 shows a curve of stored energy per horsepower plotted as a function of motor speed. This curve is approximate and is based on a number of ratings between 100 and 500 hp. While the curve may not apply to any specific ratings, it does indicate, however, that from the standpoint of stored energy per horsepower alone there is an optimum speed synchronous motor for a mill drive. This relationship is somewhat in contrast to d-c and other a-c motors for which this ratio in general becomes smaller as the rated speed is reduced.

The torque available for stopping also affects the stopping performance and therefore the stored energy per horsepower alone cannot be the only consideration. The design of a synchronous motor is extremely complex because the final motor characteristics are a composite of all the individual requirements each of which may influence one or more of the others. A design suitable for rubber mill service has to meet the special requirements of quick stopping, high starting torque, high pull-out torque and high pull-in torque, as well as the general requirement for a reasonable starting current. In addition to this the machine must be adequately ventilated and provide an economical design.

Because of the necessary "juggling" of design constants for each rating the available stopping torque will vary with differing designs. In low speed motors, for example, the percent stopping torques are often higher than in high speed motors; therefore, the percent stopping distance for low speed motors does not increase as much as a consideration of stored energy per horsepower alone would indicate.

For a particular design it is essential that the optimum amount of dynamic braking resistance be connected if minimum stopping is to be realized. Fig. 4 shows the variation in percent stopping distance of a 500-hp, 180 rpm 0.8 pf motor with different values of dynamic braking resistance. An example will best illustrate why there is an optimum resistance.

Assume that an alternator having negligible resistance and a certain inherent amount of inductance is connected to an external resistance load. The power transferred into the resistor equals I^2R. If the resistance is zero no power will be transferred. As the resistance is increased the power transferred into the resistance will increase and will reach a maximum when R equals X_L.

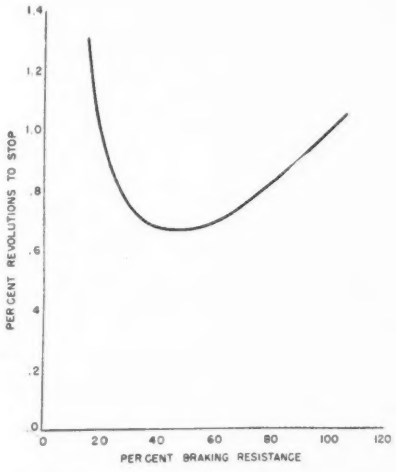


FIG. 4—Selection of optimum dynamic braking resistor will give minimum stopping distance for synchronous motors. Curve is based on a 500 hp, 180 rpm, 0.8 pf motor. (Control time not included.)

As the resistance is increased from this point the power transfer decreases. In establishing an optimum resistance value, therefore, an attempt is made to obtain maximum power transfer which will provide minimum stopping.

The action of a synchronous motor during dynamic braking is somewhat more involved than the example and it is has been proven that the optimum resistance for braking is somewhat less than indicated above. A formula for determining the optimum braking resistance, as well as the minimum revolutions to stop, is presented in the appendix.

Fig. 5 shows the calculated minimum stopping distance for a number of typical rubber mill motors rated 600 and 720 rpm. The variation in stopping distance between individual motors illustrates the inherent variations caused by the several factors affecting stopping performance. It is apparent from this illustration that the stopping of larger motors is not as favorable as smaller motors. This is due primarily to the larger diameters and correspondingly higher stored energy per horsepower which are inherent in the higher horsepower ratings.

Modifications of the simple dynamic braking scheme described are occasionally suggested and have been considered. These systems, which include field forcing, multi-step braking and the use of series resonant circuits, in general provide only small gain and involve varying degrees of system complications.

Synchronous motors can also be stopped by plugging, as will be discussed for induction motors, but dynamic braking provides the minimum stopping distance.

Mills—Induction Motors

Both squirrel cage and wound rotor induction motors are sometimes used to drive rubber mills; however, more effective stopping can generally be obtained with wound rotor motors than with squirrel cage motors. A plugging system which applies reverse phase rotation of power during stopping is usually used. A plugging switch driven by the motor allows the reverse contactor to be energized when the safety switch is operated. As the motor speed approaches zero the contacts of the plugging switch open and power is removed. The stored energy in the motor is dissipated in the rotor circuit.

To obtain the most effective stopping with a wound rotor induction motor, resistance is inserted in the secondary or rotor circuit to provide a high plugging torque. When this is done the effective value of braking torque is high throughout the stopping period. A method of calculation is given in the appendix.

In the smaller sizes where the plugging performance of squirrel cage induction motors provides generally satisfactory stopping, the substantially lower price of induction motors makes them attractive. Squirrel cage induction motors are in general limited to motors rated 125 hp at 600 rpm, 150 hp at 720 rpm, 200 hp at 900 rpm, and smaller.

In some cases in the smaller ratings double squirrel cage motors can be furnished to give very short stopping distance. The double squirrel cage motor provides a high starting torque which is uniformly high throughout the plugging period. With such a design, however, the maximum torque is usually limited to 200 to 220 percent.

Larger sizes are difficult to stop to meet code requirements because the stored energy per horsepower grows very rapidly as the motor frame size increases. In special cases, however, high starting torque motors may be furnished which will meet the safety code requirements. The operating time of plugging control also becomes a more serious problem in the larger ratings.

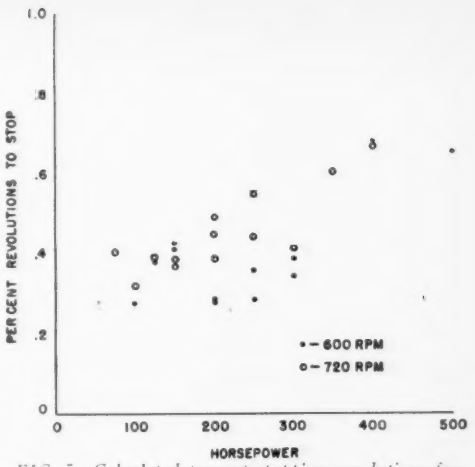


FIG. 5—Calculated percent stopping revolutions for 25 typical synchronous motors designed for rubber mill application. Data shows shorter distances for smaller motors. (Control time not included.)

D-c dynamic braking is sometimes used for stopping low voltage induction motors up to about 125 hp. With this system, a-c power is removed from the stator and d-c power is connected across two stator leads. Here the energy is absorbed in the motor rotor. The primary disadvantage of this system from the standpoint of stopping performance is the relatively low torque obtained when the motor is running at high speed which results in an excessive roll travel. Also because of the relatively large amount of d-c power required and the need for somewhat complicated control systems, particularly in high voltage installations, this system is not widely used.

Calenders

D-c motors are usually applied for driving calenders (Fig. 2) and for providing the wide range of speed adjustment required for calenders. Although the same basic problems exist in stopping d-c motors as in a-c motors, the methods of stopping and the abilities of the machines to stop differ.

The majority of calender motors are still operated from constant potential d-c shop busses and obtain the necessary speed adjustment by motor field control. When this system is used the motor must be stopped by dynamic braking. This is accomplished by disconnecting the motor armature from the line and connecting a braking resistor across the armature. At the same time the field is strengthened. Energy is dissipated in the resistor in the same manner as with a synchronous motor. There is, however, no optimum braking resistance as there is for a synchronous motor because the lower the resistance becomes the shorter will the stopping distance become. A practical limit is reached, though, when the armature current exceeds the commutating limit of the machine. Permissible commutating limits usually range from 150 to 250 percent of rated current depending on individual motor designs.

At speeds corresponding to rated armature voltage and full field the stored energy of conventional d-c motors in the sizes used for calenders is somewhat less than

comparable synchronous motors. Therefore, it may appear that d-c motors should stop in less percent distance than synchronous motors. When a wide speed range is obtained by motor field control, however, the stored energy per horsepower becomes very high at maximum speed and makes the motor difficult to stop. This is true because the motor frame size is based on rated horsepower at a low speed corresponding to full field and is therefore larger than if the frame size were based on the same horsepower at a higher rated speed.

To keep the stopping distance at a minimum it is important to build up the field current during stopping. This helps in two ways: (1) The terminal voltage is maintained at a high value throughout much of the stopping period, thus resulting in a comparably high value of braking current; (2) As the field current is increased the braking torque per ampere of armature current is increased. To be most effective the field should build up at a rate which will hold the braking current as near constant as is possible.

Because of its operating advantages and power system economies, a conventional Ward Leonard adjustable voltage drive is becoming a common drive for calenders. This type of drive offers stopping improvements over constant potential drives in two ways: (1) Since adjustable speed can be obtained by armature voltage control the amount of motor field control can be materially reduced, thus reducing the stored energy per horsepower at top speed; (2) Regenerative braking can be used to hold the armature current more nearly constant during the braking cycle.

During regenerative braking all power connections remain the same as in normal operation. Stopping is initiated by increasing the motor field current and by decreasing the generator field current in the proper sequence. The motor momentarily acts as a generator and power is transferred through the motor-generator set back to the power line. After the motor is stopped the d-c line contactor is opened.

Fig. 6 is a copy of charts taken on a high speed photoelectric recorder and shows curves of motor armature current during stopping (a) by dynamic braking and (b) by regenerative braking. Curve 6 (a) was taken on a 125 hp, 575 rpm base speed motor operating at 770 rpm by field control. Curve 6 (b) was taken on a similar 125 hp, 575 rpm base speed motor operating at 1150 rpm by field control. It can be seen that when a motor is operated with a small amount of field control the dynamic braking current drops quickly after the initial peak, whereas the current is held more nearly constant with regenerative braking.

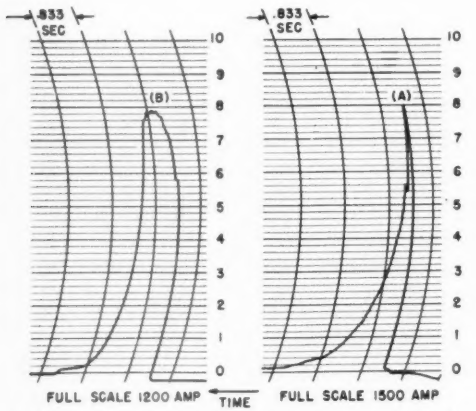


FIG. 6—Records showing armature current of typical 125 hp, d-c rubber calender motors during stopping with (a) dynamic braking and (b) regenerative braking. Data taken with a high speed photo-electric recorder.

It is beyond the scope of this paper to discuss calender load characteristics or the selection of the amount of motor field control needed. Therefore, while Fig. 7 illustrates the effect of the amount of speed range by motor field control on percent stopping distance with dynamic braking and regenerative braking, it must be remembered that load characteristics will affect the selection of the amount of field control.

The curves of Fig. 7 are based on (1) six horsepower ratings from 50 to 200 hp, (2) a top speed of 1200 rpm in all cases, and (3) a maximum armature current during stopping of 200 percent of rated. When a wide range of motor field control is used, regenerative braking offers little advantage over dynamic braking because if the motor field is built up at the proper rate using dynamic braking, the armature current will remain nearly constant over much of the braking cycle, thus causing the motor to decelerate rapidly to a low speed. Once the motor has reached a low speed it is not so important to hold the current constant because the roll travel is small in either case. As the amount of motor field control is decreased, however, the effect of field build-up in holding the armature current constant also decreases. Regenerative braking offers the greatest gain when used with a relatively small amount of motor field control.

In analyzing Fig. 7 it should be borne in mind that the data shown are typical and do not necessarily represent the results obtainable with any specific motor. Although a number of factors must be considered in arriving at the stopping distance of any particular motor, the smaller horsepower ratings in general are more favorable than the larger horsepower ratings; also, low speed motors are more favorable than high speed motors. Formulas for calculating the stopping of d-c motors are given in the appendix.

Control Operating Time

It was mentioned earlier that since the rolls move at top speed during the interval in which the control operates, this time must be held to a minimum. The total elapsed time between the opening of the safety switch contacts and the establishment of the braking power circuit includes in most systems the operating time of at least one and sometimes two power contactors plus perhaps a control relay. Although the operating time of control relays will probably not exceed 0.05 seconds, the use of control systems involving several devices operating in sequence should be avoided if possible.

The major time lag in control systems is in the power contactors, because they are of necessity large and somewhat slower moving than smaller devices. Contactor operating times are not easily calculated and must be determined by operating tests for each specific device. Although there is no direct relationship between the time of small and large contactors, it is generally true that small contactors are faster in operation. Small, low voltage a-c contactors rated 300 amp. and smaller, are constructed with a-c magnet structures. In order to obtain long mechanical life and other desirable features, however, larger size a-c contactors are usually constructed with d-c magnet structures. D-c contactors

are almost always equipped with d-c magnet structures. For a given contactor assembly an a-c magnet structure will give faster operation than a d-c magnet structure because the inductive time lag which exists in a d-c magnet does not exist to the same degree in an a-c magnet.

The contactors used in dynamic braking systems for synchronous motors often have normally closed, spring set, dynamic braking contacts on the same shaft with the main contacts. When such a device is used the drop-out time of this single device is the only time lag in the system. The operating time of this type of a device will probably be between 0.12 and 0.18 seconds, depending on the type and size contactor used. Where a separate normally closed, spring set, braking contactor is used, the control system can be arranged to initiate the operation of both contactors simultaneously and the total time will be approximately the same as a single device.

Plugging control inherently involves the use of two separate line contactors, one for the forward direction and the other for the reverse direction. In this instance, the drop-out time of the forward contactor, as well as the pick-up time of the reverse contactor, must be considered. Also, since adequate interlocking must be provided to prevent the overlapping of contactors and a resultant short circuit, an additional time lag may be involved. For the small a-c operated devices the total time may be as low as 0.12 seconds, but in the larger d-c operated devices it may sometimes be 2 or 3 times as long. The relatively long operating time of this type of system makes it undesirable in the larger ratings.

D-c dynamic braking systems include a d-c line contactor plus a spring set dynamic braking contactor. Since the two devices can be initiated simultaneously, the drop-out and arcing times only need be considered. This will again vary, depending on the size and type of the contactor, from approximately 0.1 to 0.2 seconds.

The power contactor in regenerative braking systems is not actuated during the braking cycle. It is necessary, however, to actuate contactors in the field circuits. The operating time of these contactors, plus the time required for the motor and generator field flux to change is approximately the same as for dynamic braking systems.

The operating time of control systems can be expressed in terms of percent stopping distance in a manner similar to motor stopping distances. To express control operating time in a percent figure consistent with motor stopping distance, the roll movement due to control operating time should be expressed as the percent of a minute required for the control to operate. For example, if the control operates in 0.15 seconds the percent roll travel equals

$$\frac{0.15 \times 100}{60}$$

or 0.25 percent. In determining the total motor revolutions or the total inches of roll travel required to stop, the percent distance for the motor and the percent distance for the control can be added directly and the total revolutions or distance respectively determined by the sum of the two percentage figures.

Conclusions

When electric braking systems are employed, roll travel during stopping of rubber mills and calenders can be determined with a reasonable degree of accuracy. Of the total stopping distance with the more favorable stopping systems the control operating time will generally result in from 20 to 30 percent of the total roll travel, while the motor stopping distance will be from 70 to 80 percent of the total. Although the effect of the Wk^2 of the machines and gears has been neglected in this discussion, the percent addition for external Wk^2 can be added directly to the motor Wk^2 and will affect directly the motor portion only of the total stopping distance.

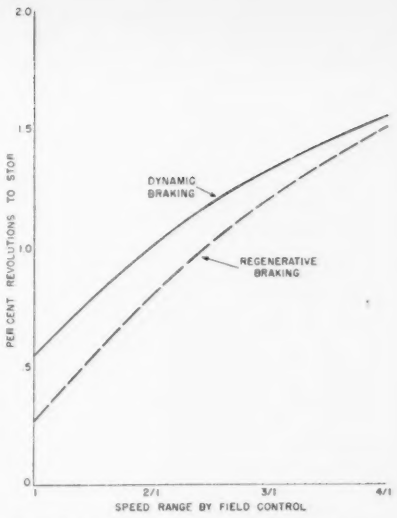


FIG. 7—Curve showing effect of speed range by motor field control on stopping of d-c rubber calender motors. (Control time not included.)

APPENDIX

It can be shown that the percent revolutions to stop for any motor can be expressed in the general form:

(1) Percent Revolutions to Stop =

$$\frac{Wk^2 \times rpm^2}{K \times 10^4 \times hp \times T}$$

where Wk^2 = Moment of inertia of motor (plus machine if desired) expressed in lb-ft² at motor shaft speed.
rpm = Motor speed.
K = A lumped constant, the exact value depending on the torque characteristics of the braking system.
hp = Rated motor horsepower.
T = Torque during the braking period expressed in percent of rated motor torque.

If a mechanical brake is used K is 1.94 (this assumes constant torque throughout the braking period), and formula (1) becomes:

(2) % Roll travel =

$$\frac{Wk^2 \times rpm^2}{1.94 \times 10^4 \times hp \times \%T}$$

If the mechanical brake rating in ft. lb. is known this can be readily converted to % torque and formula (2) becomes simply:

(3) % Roll travel =

$$\frac{Wk^2 \times rpm^2}{370 \times \text{Brake Torque in Ft. Lb.}}$$

The braking torque of most electric braking schemes is not constant but varies considerably during the braking period.

A wound rotor motor with secondary resistance such that maximum plugging torque will occur between 50% and 100% speed while plugging will produce reasonably uniform braking torque down to zero speed. In such a case the stopping formula for plugging a wound rotor motor becomes:

(4) % Roll travel =

$$\frac{Wk^2 \times rpm^2}{1.84 \times 10^8 \times hp \times \%T\ max.}$$

where % T max. = The maximum torque rating of the motor in percent of rated motor torque.

No single value of K will cover all squirrel cage induction motors for plugging because the shape of the speed torque curve which depends on the particular motor design helps to determine the value of K. For double squirrel cage induction motors the following formula will be reasonably accurate:

(5) % Roll travel =

$$\frac{Wk^2 \times rpm^2}{1.94 \times 10^8 \times hp \times \%T\ start}$$

where % T start = The starting torque rating of the motor in percent of rated motor torque.

For single squirrel cage motors having maximum torques of not less than 250% and starting torques in the range from 120% to 200% the formula becomes:

(6) % Roll travel =

$$\frac{Wk^2 \times rpm^2}{1.17 \times 10^8 \times hp \times \%T\ start}$$

Synchronous motors with dynamic braking present a little different problem. The exact analysis of the stopping performance of a synchronous motor is rather involved mathematically, but sufficient tests have been made to establish empirical data of adequate accuracy. The formula for synchronous motors is somewhat different in appearance than the basic formula but is determined by conventional design constants which are equivalent to factors in the basic formula. The following formula gives the minimum revolutions to stop based on the optimum braking resistance:

(7) Minimum % Roll travel =

$$\frac{Wk^2 \times rpm^2 \times p\text{-}f \times X'd}{0.835 \times 10^8 \times hp \times e_{ai}^2}$$

where p-f = Power factor rating of motor in per unit.
X'd = Transient reactance of motor in per unit.
e_{ai} = Internal generated voltage at first instant of braking in per unit.

To obtain an accurate result it is necessary to obtain the constants X'd and e_{ai} from the motor designers.

The ratio of

$$\frac{X'd}{e_{ai}^2}$$

may vary in high speed, high torque rubber mill type motors from .14 to .32 with an average of about .24. If a rough estimate only is required the use of the average figure may be satisfactory.

The optimum braking resistance for synchronous motors has been found to be approximately

(8) R =

$$\frac{.367 \times V \times X'd}{I}$$

where R = Braking resistance ohms per phase.
V = Rated line to line volts.
I = Rated line amps.
X'd = Transient reactance per phase in per unit value.

(If the exact value of X'd cannot be obtained a value of .3 to .4 can often be used with reasonably good results.) The stopping of a d-c motor by dynamic braking when the field is fixed can be expressed as:

(9) Percent revs. to stop =

$$\frac{Wk^2 \times rpm^2}{0.97 \times 10^8 \times hp \times T\ initial}$$

where T initial = Braking torque at first instant expressed in percent of rated torque.

If constant torque braking of a d-c motor is used the stopping distance is theoretically one-half of equation (9). The stopping distance by regenerative braking with fixed motor field approaches that obtained by constant torque braking and can be expressed as follows:

(10) Percent revs. to stop =

$$\frac{Wk^2 \times rpm^2}{1.94 \times 10^8 \times hp \times T}$$

where T = Torque (assumed constant at initial value) during braking period expressed in percent.

The calculation of stopping distance of motors with field forcing is much more involved than with fixed field and no simple formula will apply to all cases. The following guides, however, can be used in rough estimates of stopping distance:

Dynamic braking stopping of motors with field control will cover a wide range. For small amounts of field control stopping will approach equation (9). For field ranges in excess of 2 to 1 stopping distance may be appreciably less than indicated by equation (5).

Link-Belt Automatic Speed Controls

A new line of automatic speed controls for the Link-Belt P.I.V. Variable Speed Drive has been announced by the Link-Belt Co., 307 No. Michigan Ave., Chicago 1, Ill. These new controls are job-engineered for automatically controlling the output speed range of the P.I.V. and are available in four basic types—electronic, hydraulic, pneumatic, and mechanical. The uses for these automatic controls are many, such as the following examples: (a) Separate machines must be kept in accurate synchronization, often over a wide range of operating speeds; (b) Beams, feed rolls, take-up and pay-off reels must be driven at everchanging, infinitely variable speeds to keep tension constant in drawing, coating, impregnating, extruding and laminating materials of many sizes and kinds; (c) Operating cycles of differing lengths must be precisely timed and accurately maintained over varying periods without interruption; (d) Temperature, velocity, pressure, liquid levels and flow of materials must be held to narrow limits despite variations in operating conditions.

Editorials . . .

Hardship Cases

AS WAS TO BE EXPECTED, the cutback order in the consumption of new rubber for the last quarter of the year has resulted in numerous hardship appeals to Washington. It is estimated that over 300 rubber manufacturers have filed such appeals, and their cases are being processed as rapidly as possible. The Rubber Unit of the National Production Authority, which is now handling the rubber problem, is taking on new personnel as the problems increase, and with new control orders in the immediate offing it is safe to assume that the problems will increase many fold.

By far the majority of the hardship cases are being filed by small rubber manufacturers. These companies are now faced with heavy demand for their products, but the amount of rubber which they may purchase is based upon a period of relatively light demand (July, 1949, to June, 1950). The tire segment of the industry, however, is in an excellent position in this respect. During the base period, tire manufacturers were turning out units in record volume in anticipation of an active demand. The cutback order allows such manufacturers to purchase rubber in a volume which is sufficient to satisfy peak requirements. Many of the smaller producers will get hot under the collar before their appeals are settled to their satisfaction, but it would be well to remember that the cutback is an interim order only and the boys at Washington will do only the best they can.

Production Picture

THE ACCELERATED PACE of rubber production continues, undoubtedly abetted by the current high prices for the natural product and the growing appetite of the consuming industry. According to the latest figures from the Secretariat of the Rubber Study Group, world production of natural rubber in July climbed to 167,500 long tons, topping June's previous all-time high by some 10,000 tons. While production in Malaya in July reached 65,000 long tons, the highest since January, the big factor in the world picture has been the sharp and somewhat unexpected rise in Indonesian production. Indonesian exports reached an all-time peak of 71,085 tons in July, including 22,000 tons of estate rubber. Shipments from Indonesia have averaged about 65,000 tons a month since April.

The statistics indicate that in the first seven months of the current year world production of natural rubber has amounted to 987,500 long tons against world consumption of 932,500 tons, including estimated imports into Russia of 35,000 tons. Stocks available at the end of July totalled 717,500 long tons, including 247,500 tons in producing areas, 232,500 tons in consuming areas, and 237,500 tons afloat. This is approximately 7,500 tons less than were available at the end of January. Stocks in consuming areas do not, of course, include stockpiles in the United States, United Kingdom, or France. It should be evident from these figures that the current price of natural rubber cannot be attributed to lack of production effort in the Far East.

Fifth Tire

THE LIGHTS are burning far into the night again as Washington officials concerned with the rubber picture consider ways and means of conserving rubber. Proposals for specific saving measures pour into the offices, and each one is treated on its merits. One of the proposals which crops up frequently is a ban on the fifth tire supplied as standard equipment on new cars. This proposal is being especially pushed by the National Association of Independent Tire Dealers which, for years, has been urging automobile manufacturers to deliver cars with four tires only so the purchaser may have an opportunity to buy a spare tire of his own choosing.

Officials of the dealer association are well aware of the fact that few motorists would drive without a spare which means that a ban on the fifth tire would give dealers an opportunity to sell more tires, thereby eliminating any claim on rubber conservation. However, they argue that the dealers could promote conservation by urging motorists to buy recaps or good used tires, convincing them that such tires are good enough to carry as spares. Although the dealers' plan sounds feasible, we somehow can't see the owner of a new sleek and shiny car, costing over $2,000, putting a recap or a used tire in his trunk.

CURRENT NEWS OF THE MONTH

NATIONAL PRODUCTION AUTHORITY PLANS ALLOCATION OF SYNTHETIC RUBBER SOON

Members of the Rubber Industry Advisory Committee of the National Production Authority met on September 28 with NPA Administrator William H. Harrison and other Government officials to review a forthcoming NPA order which will formally allocate synthetic rubber among U. S. manufacturers of rubber products. The new allocation order will cover GR-S, GR-S latex, and butyl.

The new order will establish on an allocation basis, total new rubber consumed by each manufacturer during the 12-month period July 1, 1949, through June 30, 1950. Provision will be made for creation of a synthetic rubber reserve to take care of hardship cases. At present, synthetic rubber, which is produced in this country entirely in Government-owned plants, is being informally distributed among manufacturers by the Office of Rubber Reserve of the Reconstruction Finance Corporation.

NPA officials said the forthcoming allocation order (to be issued shortly as an amendment to Rubber Order 1, which limits the consumption of new rubber) will contain no new provisions relating to the product use of either natural or synthetic rubber.

Natural Rubber Curbs Planned

Still further limitations on the use of natural rubber are also pending. W. Stuart Symington, chairman of the National Security Resources Board, is aiming to limit the rubber manufacturing industry's use of natural rubber to 20 to 30% of its combined synthetic and natural consumption. The industry is now using about four pounds of synthetic to each six pounds of natural rubber.

The restrictions Mr. Symington has in mind, for issuance sometime during the next four months, would put the rubber products industry on close to the same synthetic-natural ratio that prevailed late in the last war. At that time, synthetic rubber production was in full swing while natural rubber supplies were greatly reduced.

A 70-30 or 80-20 synthetic to natural ratio compares with the last war's peak of 85-15, which was eventually reduced to 80-20. Even with the 80-20 ratio, product quality was seriously impaired, resulting in economic waste in man-hour losses and generally poorer performance.

Mr. Symington is reliably reported to have taken a stand for the 20 to 30% natural rubber consumption at a meeting of defense planning officials held recently in Washington, D. C. This figure goes beyond the 40% natural rubber limitation (60% synthetic to 40% natural) which the rubber manufacturing industry regards as the most stringent it should be called upon to institute under a partial preparedness control program.

Dr. John Steelman, the assistant to the president, declared recently that a 73% synthetic ratio is "probably in excess of the maximum ratio of synthetic rubber than can be used in rubber products, including truck and bus tires particularly, without restrictions on maximum loading, highway speeds, tire inspection, etc., comparable to those in effect during World War II."

Dr. Steelman expressed this opinion in a letter to Senator Lyndon Johnson (Dem., Tex.), chairman of the Senate Armed Services Preparedness Committee, promising detailed allocation, specification and inventory controls on rubber before January 1, 1951. He said these would be geared to making a maximum amount of natural rubber available for the Government stockpile.

Proposals to conserve not only natural rubber, but its use in tires particularly, is receiving an unusual amount of consideration in Washington. The amount of natural rubber used in tires may be curbed. Another proposal would eliminate the fifth tire on new cars and place a ban on white sidewall tires and other premium tires and tubes.

In the meantime the NPA rubber division is busy making company-by-company adjustments in rubber consumption quotas to prevent the loss of workers by small rubber manufacturers. Since the 20% cutback order went into effect on September 1, hardship appeals have been filed by some 300 companies, many of them alleging that cutbacks would force them below five-day production schedules. The rubber footwear industry in particular has been especially hit by the order.

Curb Pending on Latex

In accordance with an agreement reached in Washington on September 20, the National Production Authority will shortly issue a directive requiring that 10% of all natural rubber latex imports be sold to the Munitions Board. The goal was set at accumulation of 10,000 long tons of natural latex, with half to be bought by the Munitions Board and held in its strategic stockpile and half to be held by industrial consumers.

The accumulation will be secured through the following steps: (1) The Munitions Board will get first crack at 10% of imports; (2) NPA will limit industrial consumers to their average monthly consumption in the 12-month period ending June 30, 1950. Should imports, after the 10% is set aside, exceed the base period consumption limitation, NPA can allocate the excess to consumers on an appeal basis.

Latest available figures show industry stocks at 4,753 tons of natural latex on July 31. The Munitions Board has no latex in its stockpile. Industrial consumption has exceeded imports in recent months, due principally to the boom in foam rubber goods and limited latex production in the Far East.

Prospects are for early improvement in the latex imports, officials and industry report. U. S. Rubber Co. plantations in Sumatra, strike-bound from August 21 through early September, are expected to contribute substantially to increased imports The British-controlled Dunlop Rubber Co., which had announced several months ago that it would cease selling latex in this country, has agreed to sell limited quantities directly to the Munitions Board. Its contributions will be in line with those made by American-controlled companies.

August Consumption Sets Record

Consumption of new rubber during August reached a new record total of 112,602 long tons, according to the monthly report of the Rubber Manufacturers Association. This tonnage was 8¼% higher than the July consumption of 103,946 tons and exceeded the previous record established in June, 1950, by about ½ of 1%. Natural rubber used amounted to 63,741 long tons, 5.54% higher than July when 60,394 tons were consumed. The August consumption also exceeded the June consumption of 63,333 long tons. Use of synthetic rubber was up more sharply to 48,861 long tons, an increase of 12.19% over July consumption of 43,552 and about ½ of 1% higher than the June use of 48,608 tons. For the first eight months in 1950, the rubber manufacturers have used 815,593 long tons of new rubber, 23.32% higher than the comparable period in 1949 when consumption of new rubber amounted to 661,385 tons. Of the 1950 total to date 486,626 tons were natural rubber and 328,967 tons were synthetic. Consumption of reclaimed rubber was estimated at 24,164 long tons in August against 22,307 tons in July, and 25,253 tons in the month of June.

SYMPOSIUM ON APPLIED FINISHES HELD BY SO. OHIO RUBBER GROUP

Approximately 90 members and guests of the Southern Ohio Rubber Group attended the Fall Technical Meeting held on September 14 at the Engineer's Club in Dayton, Ohio. The meeting featured a Symposium on Applied Finishes for Rubber Materials and a dinner program. A special meeting of the board of directors was held between dinner and the technical meeting for the purpose of appointing an interim treasurer. R. J. Hoskin (Inland Mfg.), secretary of the group, was named to fill this post, succeeding Ted C. Argue, who moved out of the group territory.

Speakers at the technical session included Robert F. Wysocki of the Forbes Varnishes Division, Pittsburgh Plate Glass Co., Cleveland, Ohio, who spoke on "Soft Rubber Finishes"; Harold R. Bennett of the Thresher Paint and Varnish Co., Dayton, Ohio, who spoke on "Hard Rubber Finishing," and M. J. Gordon of the Gordon Paint Co., Mansfield, Ohio, who spoke on "Tailoring the Finish to the Job, and the Job to the Finish."

Hard Rubber Finishing

In his paper on "Hard Rubber Finishing," Mr. Bennett stated that since the greater part of experience in hard rubber finishing was directed to steering wheels, he would discuss this type of compound. Mr. Bennett said the procedure varies in detail with various manufacturers, but basically the process is as follows:

The steel insert or spider is formed, welded and the rubber molded around it in sufficient temperature and pressure to cure the compound. The molded rubber wheel then goes to the rubber finishing department where the flash is removed and the wheels sanded to a smooth surface. After passing inspection the wheels are ready for the washing machine to remove mold soap or release and other loose foreign matter on the surface. The hard rubber wheels are now ready for their coat of synthetic baked enamel.

Procedures For Baking

While there are several procedures for baking enamel to a hard rubber wheel, the following process, he said, will illustrate the general system: First, the hard rubber wheels are pre-heated to 180° F. which permits heavier coats of enamel to be applied in one coat. A two-coat system is recommended for service mileage. These may be applied by hand spray or automatically as both systems are successful. The advantages of electrostatic spray over hand spray include uniformity, savings in paint and faster production.

Stand out time from the spray to the oven is an important factor in the type of solvents used in the baking enamels. Finished parts entering the oven too fast will cause pinholes, due to trapped solvents. The enamels should be formulated to the customer's conditions. Baking cycles are around 275° F. for 60 minutes. The synthetic enamels are of the thermosetting type and temperatures above 265° F. are recommended.

The speaker then discussed the various problems encountered by the paint chemist in trying to formulate paints which will cover the many different rubber compounds. He discussed the matter of staining, and devoted a portion of his talk to flexibility of finishes, porosity, hardness and other subjects.

Tailoring the Finish

Mr. Gordon, in his paper on "Tailoring the Finish to the Job, and the Job to the Finish," stated that because of the individual characteristics of the many rubber compounds, the paint chemist or formulator is confronted with a challenge with each rubber problem. In the tailoring of a finish to metal or wood he can depend on the experience gained over many years. With rubber, however, he generally has a new surface to work with and new complications to overcome with each particular compound.

The experienced paint man requests a sample of the particular compound on which to test the finish he expects to tailor. If, through trial and error, he can prevent the finish from bleeding, get it to dry in spite of the wax used in the compound, and, finally, if his latest bugaboo, the silicone compounds used in the molding process which prevent drying can be overcome, he will eventually produce a very satisfactory finish for either functional or decorative purposes.

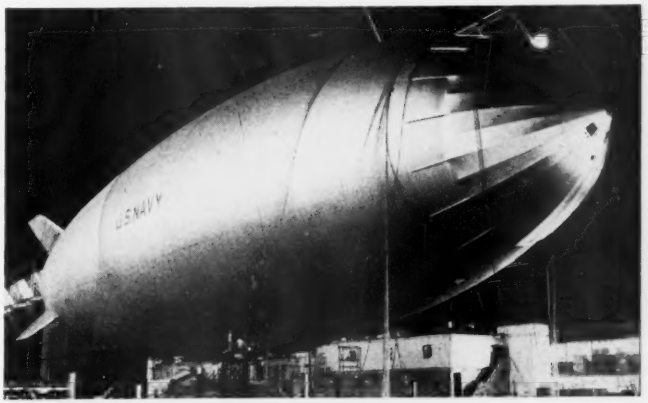
Peak Casing Production Foreseen

Passenger car tire production in the United States this year probably will exceed the 1949 output by more than 10,000,000 units, according to estimates of the B. F. Goodrich Co. Production in 1949 totaled 65,140,000 passenger car tires. The rubber company forecast takes into full consideration the government's recent order restricting the consumption of new rubbers during the last four months of this year, or until the government man-made rubber producing facilities, now being reopened, are in volume production. "In view of this new estimate of tire production, there is no reason now foreseen why passenger car tires will not be available for all essential civilian uses," James J. Newman, B. F. Goodrich vice-president, said in commenting on the estimate.

New Series of Acrylic Polymers

The Industrial Chemicals Division of the American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., has announced the availability of a series of acrylic polymers. These modified sodium polyacrylates are water-soluble anionic colloids and are available as clear straw-colored aqueous solutions. They have interesting thickening, suspending, stabilizing and film forming characteristics.

GOODYEAR CONSTRUCTING N-TYPE AIRSHIP FOR NAVAL AIR ARM



The U. S. Navy's new N-Type non-rigid airship nearing completion in the Goodyear Aircraft Corp. hangar at Akron, Ohio, is pictured above. The net shrouding the huge ship is used to hold the helium-filled envelope down while the control car and other fixtures are being attached.

Construction of the ZPN airship, a new weapon for the U. S. Navy's modernized anti-submarine warfare team, is well under way in factories of the Goodyear Aircraft Corp. at Akron, Ohio, where the big non-rigid airship was designed. The airship, identified as the "N"-type, will incorporate the Navy's latest developments adaptable to such aircraft for the purpose of locating and cooperating in the attack and destruction of enemy submarines.

The N-ship's envelope will have a capacity of 875,000 cubic feet of helium gas. This compares with 725,000 cubic feet capacity for the "M"-type naval airship that currently holds the world's sustained flight record without refueling (more than one week) and 456,000 cubic feet for the "K"-type ships, of which more than 130 were used in anti-submarine service by the Navy in World War II. The envelope of the N-type will be of neoprene-covered Fortisan rayon.

ALL-OUT SYNTHETIC PRODUCTION RAISES OUTPUT TO 835,000 TONS

In a statement before the Senate Armed Forces Subcommittee on September 17, W. Stuart Symington, chairman of the National Security Resources Board, stated that the Government had decided to go all-out in the production of synthetic rubber. This decision will boost the output of U. S. plants to 835,000 tons of synthetic rubber a year, including 760,000 tons of GR-S and 75,000 tons of special purpose rubbers. According to Governmental sources, production of GR-S should reach the annual rate of approximately 600,000 tons by the end of 1950. The planned capacity rate will not be reached until mid-1951.

The latest decision means complete reactivation of all remaining government-owned synthetic rubber plant facilities. RFC has already named operators for a number of the units to be reactivated, as reported in our previous issue, and has since announced that the Goodyear Synthetic Rubber Corporation will operate one of the copolymer units at Akron while the B. F. Goodrich Chemical Co. will take on the operation of the facilities at Institute, West Va. The Akron unit has a rated capacity of 30,000 long tons, and the Institute unit a rated capacity of 90,000 long tons.

According to Gerald B. Hadlock, head of the Office of Rubber Reserve, the Akron unit to be run by Goodyear will be operated in conjunction with two or three smaller companies, in keeping with Governmental recommendations that the smaller concerns be given an opportunity to learn the ins-and-outs of synthetic rubber production.

The decision to produce synthetic rubber at capacity levels stems, in part, from the highly critical report issued by the Senate Armed Services Preparedness Subcommittee, frequently referred to as the Johnson Committee. This report, issued on September 6, full details of which appeared in our previous issue, urged all-out production of synthetic rubber and the preparation of plans for new facilities over and above stand-by units. It is understood that the Johnson Committee is readying a second report on the over-all rubber situation which will be even more critical than the first one.

Reference Made to Pauley

During the hearings held in mid-September by the Johnson Committee on various aspects of the rubber picture, it was disclosed that Edwin Pauley, a controversial political figure, had a substantial interest in the Pacific Rubber Co., recently selected to operate a 60,000 ton polymer unit in Los Angeles in conjunction with the National Synthetic Rubber Corp., a subsidiary of the Minnesota Mining & Manufacturing Co. This information prompted the committee to summon Mr. Hadlock so that he might furnish detailed information on who has been chosen to operate synthetic plants, why they were chosen and whether or not any "pressure" had been exerted on their behalf by interested parties.

Mr. Hadlock declared that to his knowledge no one in the Government had brought any pressure on his agency to assign operation of the Los Angeles plant to Pacific Rubber. It did not participate in the synthetic rubber program during World War II, he said, but had sold tires.

He also stated that his agency took "complete responsibility" for the selection of Pacific Rubber, so far as effective operation of the program was concerned. Mr. Hadlock was instructed to supply the subcommittee with a complete record of negotiations with the company, as well as full background on its financial status.

The question of natural rubber prices also came up for discussion at the hearings. In this connection Alan Grant, formerly head of the Rubber Development Corporation and now president of the Charles T. Wilson Co., testified that 98% of recent price increases are caused by rising demand and Russian stockpiling. He added that speculation was negligible. Mr. Symington, however, stated "there is no justification whatever for the rise in the price of crude rubber which is just a gambling, speculative commodity market."

During the hearings Mr. Symington outlined an 8-point program of studies approved by President Truman as the right move to give the nation adequate plans to meet any rubber inventory; the necessary steps to secure more butadiene, styrene and other required feedstocks; methods of accelerating the stockpiling program; additional synthetic rubber facilities to be constructed; additional steps to produce natural rubber in the Americas, and methods for streamlining the vital over-all rubber program to make it more effective.

Further Stockpiling Criticism

Additional criticism of the rubber stockpiling program came from another source. During hearings held last month by the Senate Appropriations Committee, Senator Bridges (Rep., N. H.), a member of that committee, stated that "our stockpile of crude rubber is a relatively small amount even compared with what we had at the start of World War II."

The statement by Senator Bridges brought an immediate denial from Jess Larson, chief of the General Services Administration. The GSA handles the money for stockpile purchases, and had asked the Appropriations Committee for $600,000,000 with which to step up buying of all items, including rubber, on the stockpile list. Mr. Larson explained that GSA buys only what the Munitions Board tells it should be bought.

He also testified that "we have considerably more rubber in the stockpile than we had at the time of Pearl Harbor." The amount of rubber tonnage in storage is secret, and Senator Bridges said he would not divulge this information since it might be of use to an enemy. "But," Senator Bridges said, "if we have more rubber in the stockpile now, that is contrary to the information that I have."

Mr. Larson stated that all stockpiling funds of the last fiscal year have been used with the exception of $35,000,000. This sum, he said, is being held back in view of rubber procurement negotiations the GSA is presently carrying on.

RFC SEEKS CUT IN FEES PAID SYNTHETIC PLANT OPERATORS

According to trade sources, the Reconstruction Finance Corporation is attempting to cut the fees it pays to rubber companies for the operation of Government-owned synthetic plants. The RFC, it is reported, is trying to negotiate contracts for about one-half the customary fee used during and since World War II. The total amount of fees paid for operating a 760,000 ton GR-S program approximates $12,000,000 under the old system. The operators are paid about one-half cent for each pound of rubber produced.

Since June 30, some 340,000 long tons of GR-S producing facilities have been ordered reactivated. To date, not a single contract has been signed with the companies assigned to operate the plants. Moreover, RFC has not yet renewed contracts which expired prior to that date for the operation of the 420,000 tons of GR-S in the Government's pre-Korean program. The latter are being operated on short-term extensions of the expired contracts.

Trade sources indicate that RFC has been using a lower fee offer by the Phillips Chemical Co. as a "club over the rubber companies." Phillips was recently designated to operate the 45,000 ton GR-S installation at Borger, Tex., formerly operated by the U. S. Rubber Co. RFC officials have declined to discuss the matter stating that they did not wish to impede the successful negotiation of contracts.

Phillips is now reported dickering for a higher fee at the adjacent Plains petroleum butadiene plant, a 55,000-ton Government facility which it also operates for RFC. Phillips supplies the butane and natural gas to make the butadiene, one of the two main ingredients in GR-S.

It has also been charged that Phillips has been deriving substantial profits from its butadiene operation and can well afford to take a lower fee for operating the rubber plant. Its chief motive in offering to take on the Borger plant at a reduced fee, according to these same trade sources, is to get a toe-hold in the rubber industry.

On the basis of RFC's fee schedule used heretofore, the total fees paid by RFC to contract operators average out to about 3.1 per cent of the value of the synthetic rubber produced in the Government plants.

RFC has paid operators 90c per 100 pounds for the first 15,000 tons produced by one operator; 75c per 100 pounds for the second 15,000 tons, 60c per 100 for the next 15,000; 50c per 100 for the next 15,000; 40c per 100 for the next 15,000 and 30c per 100 for anything over 75,000 tons. A similar fee schedule is used for operators of Government plants making petroleum butadiene.

Goodrich has announced that it is now using cold rubber in some of its conveyor and elevator belts. According to the company, when properly compounded for use in such belts, cold rubber should add from 10 to 25% more wear in certain types of service.

MALAYAN PLANTERS CONSIDERING BAN ON RUSSIAN RUBBER SALES

According to information reaching this country, the rubber planters of Malaya are considering a ban on shipments of rubber to Russia. Thinking along these lines has strengthened since the outbreak of hostilities in Korea. Planters, it is said, are beginning to realize the potential damage being done by the sale of a vital war material to a possible enemy. Malayan planters have profited heavily on the sales of rubber during the past six months when the price of that vital commodity rose more than 200%.

In Penang, a number of rubber exporters have instituted a self-imposed ban on sale of rubber to Russia for patriotic reasons. The Penang merchants deem the sale of rubber to Russia shortsighted. They also do not wish to provoke America, which is now their best customer. These merchants, some of whom have already stopped accepting orders from Communist China through Hong Kong, have asked the British Government for a ruling on the subject.

Objection to rubber sales to Russia by Malaya, which produces about 75% of world rubber, first stemmed from the United States, where public resentment against the practice has been growing. Malaya's most influential newspaper, the *Straits Times*, also has called for a ban on the shipment of rubber to Russia. In commenting on the situation, the newspaper said: "It is in the interests of Malaya and the rest of Southeast Asia to sell America as much as they can, even perhaps at the expense of so amiable a customer as Russia."

Malayan rubber exports to Russia for the first seven months of this year were 46,747 tons. During the whole of last year, shipments to Russia totalled 63,414 tons. In 1948, 103,393 tons were shipped, while in 1947, 36,790 tons were shipped. Both Britain and the United States believe that Russia is stockpiling all natural rubber purchased from Southeast Asia. Russia is believed to have a sizeable synthetic industry on which to depend. Trade sources in Singapore think there will be little opposition generally to legislation restricting sales to Russia.

However, doubts are expressed whether Indonesia, now independent and with an annual production of approximately 600,000 tons, will fall in line with any Western plan to halt Russian rubber purchases. Any control involving Malaya alone would never be effective, trade sources indicate.

A new factor in the Communist race to stockpile war materials is the sudden appearance of Red China as a customer for Malayan rubber. That country has been moving behind the scenes in Hong Kong and placing large orders through Singapore. Hong Kong had normally imported about 200 tons monthly. In June and July, Hong Kong ordered about 3,500 tons each month.

Rubber trade sources familiar with the requirements of Hong Kong point out the excess tonnage must be finding its way to Red China.

Coming Events

Oct. 18-20. Society of the Plastics Industry, Annual Conference, Swampscott, Mass.

Oct. 20. N. Y. Rubber Group, Henry Hudson Hotel, New York.

Oct. 20. Boston Rubber Group, Somerset Hotel, Boston.

Oct. 20. Akron Rubber Group, Hotel Mayflower, Akron.

Oct. 24. Washington Rubber Group, Annual Dinner, Hotel Washington, Washington, D. C.

Nov. 10. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Nov. 26-Dec. 1. A.S.M.E., Annual Meeting, New York, N. Y.

Dec. 8. Detroit Rubber & Plastics Group, Xmas Party, Detroit-Leland Hotel, Detroit.

Dec. 11. Northern Calif. Rubber Group, Xmas Party, The Willows, Orinda, Calif.

Dec. 15. N. Y. Rubber Group, Xmas Party, Henry Hudson Hotel, New York.

Dec. 15. Boston Rubber Group, Xmas Party, Somerset Hotel, Boston.

Dec. 19. Buffalo Rubber Group, Xmas Party, Elks Club, Buffalo, N. Y.

Jan. 26, 1951. Philadelphia Rubber Group, Poor Richard Club, Philadelphia, Penna.

Feb. 28-Mar. 1-2, 1951. Rubber Division, A.C.S., Spring Meeting, Washington, D.C.

Original Equipment Tire Rise

Effective September 1, prices of tires and tubes sold to automotive manufacturers for original equipment on automobiles and trucks were increased 10% to 12½% by major tire producers. The increases, reflecting the sustained higher cost of natural rubber and other raw materials, are the first since mid-July on original equipment tires. The new advances amounted to 10% on 6.00 by 16 and smaller conventional tires and 7.10 by 15 and smaller low pressure passenger tires and 12% on the larger passenger car tires. Truck casings 7.50 and smaller were raised 10% and sizes 8.25 by 20 and larger were increased 12½%. Inner tubes in the respective size ranges were advanced like amounts. In July, prices of passenger car tire were increased 8 to 10% and truck tires by 12½%. Original equipment tires are supplied the automotive manufacturers almost entirely by the four major rubber companies—Goodyear, Firestone, U. S. Rubber and Goodrich. The latest original equipment advances followed a series of price increases on replacement market tires for automobiles and trucks in July and early August.

FIRST NPA REGULATION IMPOSES INVENTORY CONTROLS ON RUBBER

The first official action promulgated by the newly organized National Production Authority, on September 17, ordered inventory controls on rubber and 31 other important war materials in order to curb commercial stockpiling of these commodities. Consumers will not be directly affected by the order, announced by Administrator William H. Harrison. The buying public may continue to purchase all articles as in the past. Manufacturers, however, will be obliged to limit their stocks of the controlled materials to a "practicable" minimum working inventory.

Such a "working inventory" is defined in the regulation as the "smallest quantity of any material from which a person can reasonably meet his deliveries or supply his services on the basis of his currently scheduled method and rate of operation." Officials said the primary object of the order was to make sure that critical materials would not be diverted from defense plants by civilian users. Types of rubber materials included in the order are: natural rubber (dry and latex) and synthetic rubbers, including latices, GR-S, butyl, neoprene and N-types.

"The purpose of the order," Mr. Harrison explained, "is to make clear that national interest demands there be no accumulation of materials beyond what is needed for immediate production and that it is the responsibility of both the purchaser and supplier to assume that the spirit of the order is lived up to.

"This will require the most exacting review of inventories and ordering procedures at all levels to insure that the materials available actually produce the maximum volume of goods and service."

Under the order, a violator may be anyone who buys more than a normal operating supply of any of the materials covered, or who sells them, knowingly, to a hoarder. The recently enacted Defense Production Law, on which the order is based, provides for penalties of up to $10,000 in fines and one year in prison for violations.

Mr. Harrison emphasized the obligation that the order places, not only on buyers of the controlled materials, but also on suppliers. The supplier, Mr. Harrison said, may not deliver any material if "he knows or has reason to believe" that his customer is not permitted to receive it.

The order does not provide for disposing of excess inventories now on hand, but the law, it was explained, gives Mr. Harrison's agency authority to requisition inventories held to be too large.

An anti-inflationary motive was also attached to the action. It was designed partly to keep industry from building up excessive stocks to the point that prices would climb in the competitive bidding. Speculators, likewise, would be discouraged from buying up large stocks with the hope that they would profit in a rising market. Officials said they foresaw no shortages developing on the consumer market as a result of the order, since there was no shortage immediately in prospect in the materials themselves.

DUNLOP'S FOAM SPONGE PATENTS UPHELD IN SUIT AGAINST MARMAX

In a decision of major importance to all manufacturers of latex foam sponge rubber products, handed down by Judge Harold P. Burke of the United States District Court for the Western District of New York on June 28, 1950, Marmax Associates, Inc., of Rochester, N. Y., was held to have infringed all of the claims of U. S. Patent No. 1,777,945, all of the claims of U. S. Patent No. 1,852,447, except claims 4, 5 and 6, and eight claims of U. S. Patent No. 1,994,503. The decision was based on a suit filed on November 24, 1948, by the Dunlop Tire & Rubber Corp., of Buffalo, N. Y., against Marmax Associates, manufacturers of latex foam products, principally dress shields.

In its suit Dunlop charged infringement of the three patents involved, namely, U. S. Pat. No. 1,777,945, issued to Untiedt on October 7, 1930; U. S. Pat. No. 1,852,447, issued to Chapman, Pounder and Murphy on April 5, 1932, and U. S. Pat. No. 1,994,503, issued to Chapman, Pounder, Murphy and Purkis on March 19, 1935. Dunlop is the owner of two of the patents —Nos. 1,852,447 and 1,994,503—and is the exclusive licensee and equitable owner of the third—No. 1,777,945.

Two of the patents—No. 1,777,945 (Untiedt) and No. 1,852,447 (Chapman, Pounder and Murphy)—have expired, the Untiedt patent having actually expired before the commencement of the suit. Accordingly, in his decision, Judge Burke stated that Dunlop was entitled to judgment on all three patents and to a decree enjoining Marmax Associates against further infringement of U. S. Pat. No. 1,994,503.

The three patents involved relate to the treatment of rubber latex and to processes and products useful in the manufacture of latex foam sponge rubber products. The Untiedt patent (No. 1,777,945) describes and claims a process in which rubber latex, to which a foam stabilizing agent such as soap has been added, is beaten to a dense foam, and is then solidified still retaining the foam structure. The Chapman, Pounder, Murphy and Purkis patent (No. 1,994,503) covers a method for controlling the gelling of latex by adding a small amount of silicofluoride to an alkaline latex. The Chapman, Pounder and Murphy patent (No. 1,852,447) covers a process for making cellular rubber-like structures by incorporating a frothing agent and a gelling agent into an aqueous dispersion of rubber, forming the mixture into a froth and gelling it.

Discussion on Untiedt Patent

Referring to the Untiedt patent, Judge Burke held that the prior art does not disclose any process in which a rubber latex containing a foam stabilizing agent is beaten or otherwise formed into a foam and then solidified. Answering the defendant's arguments, he held that the Schidrowitz and Golborough patent (No. 1,156,184) does not use a latex foam, but forms a porous coagulum, a spongy solid, as distinguished from foamy latex; that the McGavack patent (No. 1,523,821) does not aerate nor beat treated latex to form a dense useful foam, and that the Hauser patent (No. 1,729,651) covers a foamy mixture containing numerous fine bubbles, but the bubbles merely occur in the process and pass away. He added that Hauser's foam does not dry out to form a porous sheet.

Further, Judge Burke held that the Beckman patents (U. S. No. 1,745,657 and British No. 240,430), covering a process of making microporous rubber, did not anticipate Untiedt and that the process was, in fact, directly contrary to that used by Untiedt; that the Battilani patent (No. 1,818,372), which was co-pending in the Patent Office with Untiedt, did not cover the use of latex but rather contemplated the making of a porous rubber product by heating a confined mass of rubber or substitute material to a liquid state and then subjecting it to the action of compressed air while being agitated, to form bubbles or cells of compressed air, which are trapped in the mixture, and that the Twiss and Murphy patent (No. 1,846,164), which was also co-pending with Untiedt, while disclosing a process of compounding and concentrating rubber latex by agitation, did not indicate that the accidental and undesirable feature of air in the mixture could be successfully utilized to make foam rubber articles.

Concluding his remarks on the Untiedt patent, Judge Burke pointed out that Untiedt's foam structure is obtained by beating until all of the latex is taken up in a mass of substantially uniform fine bubbles of sufficient stability to enable it to be dried or solidified retaining that structure, and held that the difference from the prior art in the process and in the product obtained was critical and decisive.

Application of Silicofluoride

In connection with the Chapman, Pounder, Murphy and Purkis patent (No. 1,994,503), Judge Burke pointed out that it disclosed a method for controlling the gelling of rubber latex by adding a small amount of silicofluoride to an alkaline latex, and that the major purpose of the process is to provide an interval of time between the adding of the silicofluoride and gelling so as to allow the latex to be poured into a mold and to avoid clot formation.

Referring to the fact that silicofluorides had been used to coagulate and separate rubber from its aqueous medium, Judge Burke held that the prior art contains no disclosure of gelling alkaline latex by such materials and further that no previous use of silicofluorides indicated that such use would gel rather than coagulate or clot an alkaline latex or dispersion. He added that since the patent in question was based on an application filed March 24, 1933, which was a continuation in part of an earlier application filed November 13, 1929, which, in turn, was based on a British application filed December 7, 1928, the rights of the patentees were unaffected by the issuance of two foreign patents covering the same subject matter, namely, British Patent No. 332,525 (August 21, 1930), and French Patent No. 686,285 (April 8, 1930).

In reply to the brief filed by Marmax Associates with regard to the Sandmann patent (No. 935,414) and articles appearing in various technical journals, all dealing with the use of hydrofluosilicic acid or its salts for the coagulation of latex, Judge Burke held that what was sought was a coagulation of the latex to produce a clot of rubber separated from the serum; in all of them plantation rubber, not alkaline latex, was treated, and in all of them clotting, not gelling, was obtained. Since the patent involved is only for the process of gelling with silicofluorides in an alkaline latex or dispersion, he held that the Beckman patent (No. 1,745,657), the Russel patent (No. 1,601,772) and the Pestalozza patent (No. 1,717,248) did not anticipate.

Findings on Later Patent

With regard to the third patent involved —the Chapman, Pounder and Murphy patent (No. 1,852,447)—Judge Burke stated that the process covered differs from the Untiedt process in the gelling of the froth shortly after its formation, without impairing the frothy structure, and that it combines the Untiedt method of foaming with the gelling step covered in the Chapman, Pounder, Murphy and Purkis patent, but is not limited in all the claims to the use of silicofluorides. It has two distinct advantages over the Untiedt method: (1) It enables the froth to set as soon as formed, thus avoiding the possibility of breakdown of the cellular structure, and (2) The material may be formed to a fluid froth rather than to a stiff foam, and may be poured in a fluid condition into a mold and then set.

Stating that the process covered in this third patent facilitates the manufacture of foamed rubber articles and widens the field to which the manufacture of foamed latex may be extended, Judge Burke ruled there is no disclosure in the prior art of the combined steps of frothing and gelling, nor of a dispersion of rubber-like material having a frothing constituent and a gelling constituent.

In his final conclusion Judge Burke held that the claims of all three patents involved in the suit are valid claims and decreed judgment and enjoinment as indicated above. It is not known at this writing whether Marmax Associates, Inc., intends to appeal the decision.

Goodrich Wins Safety Award

As a result of establishing, last year, the best annual safety record in its history, the B. F. Goodrich Co. has been granted the Distinguished Service to Safety Award of the National Safety Council. The presentation was made on July 24, at a special luncheon in the Hotel Mayflower, Akron, Ohio. The record on which the reward was made was the reduction of the combined frequency rate for accidents in the 24 plants of the company in the United States and Canada. The frequency rate was reduced 39% from the 1948 figures to a new low of 3.21 injuries for every million hours worked, and a decrease in days lost of 56% for the same years.

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ABRASIVES COMBINE DISSOLVED BY FEDERAL ANTI-TRUST SUIT

Judge Charles E. Wyzanski, Jr., of the Federal District Court in Boston, Mass., ruled on September 13 that the action of four leading American manufacturers of coated abrasives in combining to manufacture jointly in foreign countries was a violation of the Sherman Anti-Trust Act.

The jurist ordered the four companies to terminate their joint ownership of foreign factories and to dissolve the Durex Corporation of Jersey City, N. J., jointly owned by them. Judge Wyzanski's decree, however, permitted the four companies, acting alone, to operate or acquire any of the foreign factories.

The ruling was made in an anti-trust suit brought by the Federal Government against the Minnesota Mining and Manufacturing Company, St. Paul, Minn.; Behr-Manning Corporation, Worcester, Mass.; the Carborundum Company, Niagara Falls, N. Y., and Armour & Co., Chicago.

The suit also involved the Durex Abrasives Corporation and the Durex Corporation, both of Jersey City. Durex Abrasives, owned by the four companies, was formed in 1929 to engage in the coated abrasives export trade. Durex Corporation, formed at the same time, owns and operates several foreign plants manufacturing coated abrasives and also holds numerous foreign patents.

Coated abrasives were described as including waterproof sandpaper and garnet abrasives manufactured in the form of sheets, belts, discs and cones. They are widely used in processing of wood products, motor car and shoe manufacturing and other mass production industries.

The suit was filed by the Department of Justice on January 28, 1947, and was tried in June of this year. It charged the four companies with conspiring to restrain foreign commerce in coated abrasives.

Judge Wyzanski found that in 1929, the year that the two Durex subsidiaries were formed, the four defendant companies controlled four-fifths of American exports of coated abrasives. He said the four agreed to export jointly through Durex Corporation, formed as an export association under the Webb-Pomerene Act.

When exports to Great Britain, Canada and Germany were restricted by tariffs and currency regulations, beginning around 1929, the court found that the four American companies jointly established and operated factories abroad for the manufacture of coated abrasives. This, Judge Wyzanski ruled, was in violation of the Sherman Act.

At the same time, Judge Wyzanski turned down a government request that the export association, Durex Abrasives Corporation, be dissolved or limited. Attorneys for the Department of Justice held that the corporation had been created and operated with features not permitted sociation. Copies of the bulletins (Nos. under the Webb-Pomerene Act.

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GOODYEAR ANNOUNCES PROMOTION OF FRY AND CASE AT GADSDEN

John M. Fry

C. R. Case

John M. Fry, formerly technical superintendent of the Gadsden, Ala., plant of the Goodyear Tire & Rubber Co., has been named technical consultant for operations at the plant. C. R. Case, formerly assistant technical superintendent, has succeeded Mr. Fry as technical superintendent of the plant.

Mr. Fry, who recently completed 39 years' service with the company, started as a chemist at Akron. He was assigned to Gadsden operations in May, 1929, as development manager, becoming technical superintendent in April, 1946. Mr. Fry is a graduate of West Chester State College in Pennsylvania, and Cornell University.

Mr. Case, who became assistant technical superintendent in February of this year, joined the Goodyear organization in June, 1933, as a member of the company's production squadron. He has specialized in tire development and design work, and during the war was loaned to the War Production Board as a tire technician. Mr. Case is a graduate of Northern University.

Witco Disperso Zinc Stearate

Witco Chemical Co., New York 17, N. Y., has announced the development of "Disperso Zinc Stearate," which offers the rubber industry a means of coating large surface areas efficiently and economically without the annoying dusting typical of manual operation. The material is an easily wettable white powder which, when added to water with gentle agitation, disperses readily, forming a slurry having excellent suspension properties. Rubber sheets or extruded goods when briefly immersed in this suspension pick up a thin film of zinc stearate which prevents sticking on subsequent storage, the company states. It is also possible to control the thickness of the stearate film applied by regulating the percentage of zinc stearate in the suspension.

Falk Engineering Bulletins

The Falk Corporation, Milwaukee 8, Wisconsin, recently issued four new engineering bulletins illustrating and describing the improved Falk Parallel Shaft Speed Reducer and the Right Angle Speed Reducer (both horizontal and vertical). These speed reducers are designed for a wide variety of power transmission requirements for almost every industry and are rated according to the standards of the American Gear Manufacturers As- 1110, 1115, 2105 and 2110) are available on request to the company.

Hewitt-Robins Shifts Personnel

In another step in its program to further centralize overall responsibility for operations in New York, Hewitt-Robins, Inc., has announced three shifts in executive personnel of the company. Vice-president B. T. Moffatt, located in New York, has been named general manager of the company's Hewitt Rubber and Robins Conveyor Divisions in addition to his previous responsibilities, which included supervision of sales for these two divisions. W. H. Watkins of the Buffalo, N. Y., office, formerly controller of the company, has been appointed treasurer. Ellis B. Gardner, previously assistant controller, has been named controller. Mr. Gardner is located in the New York office.

Vinylite Resin Prices Increased

Bakelite Division of the Union Carbide and Carbon Corp., New York 17, N. Y., has announced increases in prices for all Vinylite resins and compounds and for Bakelite polyethylene resins and compounds effective September 15. The price increase for Vinylite resins is slightly under 6%, with prices for resin compounds rising proportionately. The price of Bakelite polyethylene resins has been raised approximately 4½%. The new prices for Vinylite resins are considerably below those current in 1939 and the new polyethylene resin prices are less than 50% of the price at which they were made commercially available in 1943.

USE OF DIALKYL PEROXIDES IS SUBJECT OF TALK BY GEE

Dr. Geoffrey Gee, director of research for the British Rubber Producers' Research Association, was the principal speaker at a meeting of the Thiokol Club, held at the plant of the Thiokol Corporation in Trenton, N. J., on September 28. Dr. Gee, currently in this country in connection with the International Meeting of the Rubber Division, A.C.S., gave an excellent talk on "Dialkyl Peroxides as Rubber Vulcanizing Agents." The talk was in the nature of a report of some of the work carried out in the BRPRA laboratories, mainly by Dr. C. G. Moore. An abstract of the talk follows:

It is well known that di-tertiary butyl peroxide decomposes on heating to temperatures in the neighborhood of 140° C., the primary products being tertiary butoxy radicals. In the presence of almost any hydrocarbon or other compound capable of giving up hydrogen atoms readily, most of these radicals are converted into tertiary butyl alcohol, the hydrocarbon thus forming a free radical, e.g., with cyclohexene:

$$\begin{aligned} &BuO{-}OBu \rightarrow 2BuO^{\bullet} \\ BuO^{\bullet} &+ C_6H_{10} \rightarrow BuOH + C_6H_9^{\bullet} \\ &2C_6H_9^{\bullet} \rightarrow C_{12}H_{18} \end{aligned}$$

In general, most of the hydrocarbon radicals combine with one another, thus linking the original hydrocarbon molecules together in pairs. If the hydrocarbon is a polymer, e.g., natural rubber, this linking process is a vulcanization reaction:

$$\begin{aligned} &{-}CH_2 \bullet CMe{:}CH \bullet CH{-} \\ &{-}CH_2 \bullet CMe{:}CH \bullet CH{-} \end{aligned}$$

In practice, the reaction is by no means as simple and clear-cut as this. Various side reactions are possible and their incidence in any particular case depends upon rather fine details of the hydrocarbon structure. Among side reactions which have been identified are the following: (1) Isomerization by double bond shifts; (2) Loss of unsaturation by vinyl polymerization; (3) Increased unsaturation resulting (probably) from interaction between butoxy and hydrocarbon radicals; (4) Cyclization, this being especially important in 1:3 dienes such as natural rubber.

Technical Evaluation

This reaction has been used to produce vulcanizates from natural rubber, and a start has been made on the technical evaluation of the process and products. For mill mixing the peroxide can more conveniently be replaced by less volatile materials and reverters have been found effective. Superficially, the vulcanizates differ little from conventional ones. Thus, the tensile strength first rises and then falls steeply to low values as the degree of cross-linking is progressively increased, and the optimum value is of the usual order.

As would be expected from the fact that no foreign atom is introduced, the vulcanizates have outstanding electrical properties, essentially those of raw rubber. Preliminary investigation suggests that their aging is good, as would again be expected from their chemical nature. Another interesting observation is that a pure gum vulcanizate can be stretched without formation of the vacuoles found with any normal compound containing zinc oxide or other particulate material.

"There appears to be no essential technical difficulty in using the process, should further investigation reveal applications which would justify its cost.

Specialty Rubbers

Some interesting figures on the production of special natural rubbers in Malaya were recently made available by the Secretariat of the Rubber Study Group. In the first quarter of 1950, approximately 3,575 long tons of rubber sold under trade marks were produced, 45 tons of softened rubber, 63 tons of chemically modified rubber, 264 tons of rubber containing peptizers, and approximately 2,610 tons of non-standard grades prepared according to a patented or technically specified procedure. A grand total of approximately 6,560 long tons of special natural rubbers were produced in the period.

Connecticut Group Holds Outing

Approximately 130 members and guests of the Connecticut Rubber Group attended the annual outing held on September 16 at Scollins Grove, Park Lane, Long Hill, Conn. The outing featured different athletic activities including golf, softball, horseshoes and field events. A roast beef dinner was also served. Dave McKean (Whitney-Blake) acted as chairman for the Outing Committee. Ray Dudley (Whitney-Blake) was treasurer. Other members on the Outing Committee included Don Spengler (Sponge Rubber Products), Ken Cary (Burgess Pigment), Whitey Larson (Whitney-Blake), John Tronson (Vanderbilt), Andy Stumpf (Du Pont-Fairfield), Gus Maassen (Vanderbilt). George D'Olier (Raybestos-Manhattan) took charge of arrangements for the softball game. Carl Larson arranged for the field events, while Milt Greenhalgh (G-E) planned the egg throw. The horseshoes games were under the direction of Andy Stumpf. The Reception Committee was headed by John McKay (Phillips Petroleum) as chairman, and included D. F. Spengler, C. Larson and C. Sprague all of Whitney-Blake. The distribution of prizes was in the hands of Ken Cary.

Quebec Group to Hear Crocker

The October 19 meeting of the Quebec Rubber and Plastics Group will be addressed by E. Charlton Crocker of the General Latex and Chemical Corp., Cambridge, Mass. Mr. Crocker will speak on the "Manufacture of Latex Foam Sponge Rubber."

CONTINENTAL OIL BLACK FORMED FOR PRODUCTION OF HAF BLACK

Organization of a new company, Continental Oil Black Company, was announced recently by R. I. Wishnick, president of Continental Carbon Company, and L. F. McCullom, president of Continental Oil Company, joint owners of the new enterprise. A $1,500,000 plant will be erected at Lake Charles, La., designed to manufacture 25 million pounds annually of high abrasion furnace black from oil.

The announcement followed action by the Louisiana Board of Commerce and Industry in approving a 10-year tax exemption for the new plant. Contracts for the Lake Charles carbon black plant have been signed and construction will begin immediately. The plant will be located just east and adjacent to Continental Oil's refinery and is scheduled for completion early in 1951. Raw material for the new plant will be piped direct from Continental Oil's refinery.

The recent government directive designed to conserve the use of natural rubber, plus the rise in the use of "cold rubber," are expected to stimulate substantially the demand for high abrasion furnace black. A portion of the output of the carbon black will be funneled into the expanded synthetic rubber production along the Gulf Coast.

The Witco Chemical Company of New York will be distributors of the plant's production.

Ontario Group Hears Murphy

The September 26 meeting of the Ontario Rubber Group of the Chemical Institute of Canada, held at Hart House at the University of Toronto in Toronto, was attended by approximately 125 members and guests. Principal speaker for the evening was E. A. Murphy, manager of the General Development Division of the Dunlop Rubber Co., Ltd., London, England. Mr. Murphy spoke on "National Latex Today—Some Aspects of Research and Production". The speaker touched upon the technical, production and political picture in the Far East. He also spoke of fundamental problems of research and production which are being studied at the new Dunlop Research laboratories in Malaya and England. Mr. Murphy illustrated his address with a series of slides on Malaya.

Quebec Holds Stag Dinner

Approximately 60 members and guests of the Quebec Rubber and Plastics Group attended the first meeting of the 1950-51 season held on September 22 at the Queen's Hotel in Montreal, Que., Canada. The function consisted of a stag dinner, group singing and bridge playing. Norman Smith (Dominion Rubber), chairman of the group, gave a short introductory talk welcoming the new members. Robert Bales (British Rubber), the retiring chairman, also spoke briefly. Bob Huggenburger (Dominion Rubber) acted as master of ceremonies for the group singing. R. G. Davies (Canadian Industries) was in charge of arrangements for the meeting.

REPORT ON SECOND MEETING OF ASTM CRUDE RUBBER GROUP

The second meeting of the recently-organized Subcommittee XII on Crude Natural Rubber of Committee D-11 of the American Society for Testing Materials, of which Norman Bekkedahl (Bureau of Standards) is chairman, was held on June 29 in Atlantic City, N. J., during the 53rd Annual Meeting of the parent society. (A report on the initial meeting of this new and important subcommittee appeared in our September, 1950, issue).

At this Atlantic City meeting, C. B. McKeown, of the B. F. Goodrich Company, presented a report describing the method used in his laboratory for the quantitative determination of foreign material such as dirt, sand, bark, etc., in crude natural rubber. In his procedure, a hot solution of the rubber is passed through a 35-mesh screen. The material left on the screen is considered as foreign material. The smaller particles, which pass through the screen, are considered unimportant and therefore can be neglected. Mr. McKeown reported that he has prepared mimeographed reports on the procedure and will be glad to send a copy to those who are interested.

C. O. Miserentino, of the Dunlop Tire and Rubber Company, described a somewhat different procedure used successfully by his company, in which the rubber is passed directly through a screen of 0.020-inch openings without the preparation of a solution. After some discussion on the subject, including techniques of sampling rubber, a motion was made, seconded, and passed that the chair appoint a task group to continue the study of methods for this important analysis.

A report was next presented by A. E. Juve, of the B. F. Goodrich Company, on compounding recipes for crude natural rubber which were developed by his special A.S.T.M. subcommittee on standard samples for the preparation of standard rubber compounds. He reported that the formulas recommended by his group for standard compounds were not developed with the view of their being used as test formulas. He therefore would not recommend that the standard rubber formulas be used for grading purposes without further study.

After considerable discussion on the subject a motion was made, seconded, and passed that a task group be appointed to study compounding formulas and test procedures for the grading of crude natural rubber. The task group shall collaborate with the rubber producers of the Far East in studying the French system and other possible systems of classification of rubber. It will determine whether or not there is likelihood of the appreciable change in physical properties of raw rubber between the time of testing at the plantation and after arrival in this country.

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Announce Expansion Program

A new expansion program and transference of offices and personnel from Youngstown, Ohio, to Ellwood City, Penna., during the summer of 1951 has been announced by the Aetna-Standard Engineering Co. Under the plan, all business currently conducted in Youngstown will eventually be carried on in Ellwood City, except for executive management and sales operations. Aetna-Standard recently entered the rubber and plastic industries through association with Hale & Kullgren, Inc., of Akron, rubber and plastic machinery consultants. In the past, Aetna-Standard's plant at Warren, Ohio, built most of the company's flat rolled finishing equipment, but the plant now assumes greater importance to the company in that it will build rubber and plastic machinery and equipment to specifications furnished by the Akron firm.

Okonite Awarded Large Contract

Bonneville Power Administration, Portland, Ore., has awarded a $409,754 contract to the Okonite Co., Passaic, N. J., for the manufacture of what is said to be the longest high voltage rubber insulated submarine power cable in the world. The continuous length of 38,000 feet will be nearly five inches in diameter and weigh over 18 pounds to the foot. Scheduled for shipment next May, the cable will provide Columbia River power service for the San Juan Islands group in Washington's Puget Sound.

Enlarges Government Sales Staff

Seiberling Rubber Co., Akron, Ohio, has enlarged its Government Sales Department and has opened a sales office in Washington, D. C., under Harry H. Slevin. Mr. Slevin was formerly manager of Auto-Lite of Georgia in Atlanta, Ga. James H. Higgins, formerly in charge of manufacturers' sales for Seiberling, has been named manager of the new Federal Government and Manufacturers' Sales Department, with headquarters in Akron. William F. Firick, previously in charge of Government sales, has been named operating manager of the new department. Carl J. Figenscher, formerly a member of the Truck Tire Sales Department, has been transferred to the new department as a sales representative. Both Mr. Higgins and Mr. Slevin served with the Office of Rubber Director in Washington during World War II. Mr. Higgins was assistant director of operations during most of the war, and Mr. Slevin served for over a year and then went into Navy service.

Kraft Named Tyson Agent

Kraft Chemical Co., 917 West 18th St., Chicago, Ill., has been appointed exclusive midwest agent for the Tyson Corp., Woodbridge, N. J., manufacturers of rubber substitutes and vulcanized vegetable oils. Kraft has made available laboratory facilities to supply technical advice, suggest correct substitutes or match samples.

G-E MASS SPECTROMETER INSTALLED AT GOODRICH RESEARCH CENTER

The mass spectrometer seen in the above reproduction was recently installed in the Goodrich Research Center at Brecksville, Ohio. The instrument was developed by the General Engineering and Consulting Laboratory of the General Electric Co., Schenectady, N. Y. The principle of operation of the spectrometer is the separation of gas molecules according to their mass by ionizing the gas, accelerating the ions, and deflecting them in a magnetic field. By varying the magnetic field, each mass can be made to traverse a geometrical orbit and be picked up on a collector plate. A chart or graph of the collector plate current versus time correlated with the mass number by means of a mass marker is the mass spectrum. Goodrich scientists expect the newly-installed unit to answer some of the unsolved rubber problems.

Titanium Pigment Personnel Changes

Graham W. Corddry has been elected vice-president in charge of sales of the Titanium Pigment Corp., subsidiary of the National Lead Co., in a realignment of company sales personnel. K. W. Ericson, formerly western sales manager of the corporation, has been appointed general sales manager of Titanium. H. L. Jungmann will continue as assistant to the general sales manager. John A. Lutz, formerly manager of the technical service department, has been appointed eastern sales manager, succeeding W. H. Woods. Mr. Woods succeeds Mr. Ericson as western sales manager, with headquarters in Chicago. E. G. Burling will continue as Pacific Coast sales manager, with headquarters in Los Angeles.

Earl W. Diener, formerly in charge of the New England territory, has been appointed a district sales manager, the district consisting of the New York, New England and Pittsburgh areas. W. F. Malcolm will be in charge of the New England territory, succeeding Mr. Diener in that position. His headquarters will be in Boston. Norman E. Olson, sales representative, has been appointed a district sales manager, his district consisting of the Chicago area and midwestern and southern states west of the Mississippi River. Mr. Olson will be located in the Chicago office.

Fred R. Hodgson, sales representative, has been named a district sales manager, with territory consisting of the Cleveland area and midwestern and southern states east of the Mississippi River. His headquarters is Cleveland. W. Schoonmaker will continue as district sales manager of the Philadelphia area and southeastern states, with headquarters in Philadelphia. James MacGuffie has been appointed manager of the technical service department of the Titanium Pigment Corporation, with headquarters in New York City.

Richardson Proposes Stock Split

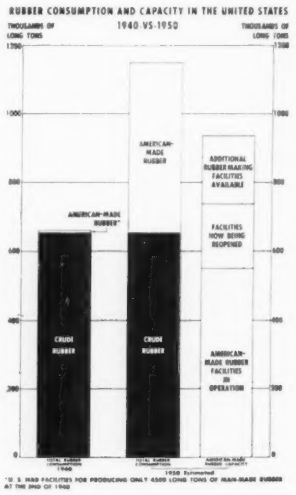
Richardson Co., Lockland, Ohio, has offered to its shareholders a proposal to increase and change its authorized shares from 250,000 shares, without par value, to 500,000 shares with a par value of $12.50 a share. "It is believed," said Charles L. Keller, president of the company, "that the proposed two-for-one split, if approved by the stockholders, will broaden the market for the common stock of the company." Mr. Keller also stated that the proposed stock split will reduce the Federal stock transfer tax imposed on the transfer of these shares. Stockholders were scheduled to vote on the plan on October 11.

Rename Bishop Gutta-Percha

The name of the Bishop Gutta-Percha Co. has been changed to the Bishop Manufacturing Co. and the factory moved from its New York location to 10 Canfield Road, Cedar Grove, N. J. At its new plant, Bishop is processing rubber compounds, Bi-Seal electrical tape, Bi-Prene neoprene tape, and continuing the production of gutta-percha compounds and coated materials.

Chart Outlines Rubber Position

The nation's present rubber supply position compared with 1940 is illustrated in the accompanying chart prepared by The B. F. Goodrich Co. In 1940 the United States consumed 650,000 tons of rubber, 97 per cent of which was imported from the Far East. There was then in existence



in this country capacity to produce only 4500 tons of synthetic rubber of all types. Today the nation is consuming rubber at a rate of more than a million tons a year but has facilities for producing 940,000 tons of synthetic rubber. Output of man-made rubber will be at the rate of 740,000 tons early in 1951. During the latter months of World War II America turned out synthetic rubber at a rate of a milion tons a year.

Rubber Use in Roads Lessened

According to the Bureau of Public Roads of the U. S. Department of Commerce, the use of rubber in highway construction has slowed considerably. One reason is the Korean war which has resulted in spotty shortages of rubber. A department official stated that the test roads which have been built don't show enough improvement to warrant paving mile after mile of them. This authority estimated that $2,500 is added to the cost of every mile of highway to which some form of rubber is added to the surfacing material. The official observed that none of the test highway sections built to date has been down long enough to observe the wearing qualities of such paving accurately. The department official further stated that state highway departments will not rush for the rubber roads until they can be shown that the new paving offers more than just protection against skidding. Otherwise, the added cost of the paving is likely to rule against its use.

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Personnel Changes at Goodrich

In a series of personnel changes recently announced by E. F. Tomlinson, general manager of the Industrial and General Products Division of the B. F. Goodrich Co., Paul W. Van Orden was named industrial products merchandise manager and Richard G. Cox was appointed manager of original equipment sales. Wilfred A. Smith was appointed manager of molded, extruded, lathe cut and sponge sales, while George J. Fischer was named manager of V-belts and packing sales. Mr. Van Orden, a graduate in engineering of the Michigan School of Mines, has been with the company 22 years, all in industrial products sales. Among posts he has held are those of product manager, manager of hose and belting sales and for the last two years manager of "V" belt and packing sales. Mr. Cox has been with the company 25 years and in industrial products sales for the last 19. He had been manager of lathe cut, molded, extruded and sponge sales for the last five years. He is an engineering graduate of the University of Akron. Mr. Smith started with B. F. Goodrich as a mail clerk 26 years ago, and has been in industrial products sales or engineering for the last 19. During World War II he was on the company's Washington staff handling technical problems on products supplied the government. For the last five years he had been manager of rubber suspension sales. Mr. Fischer joined the company 16 years ago, and has been in industrial products sales for 11 years. He had served as division operating manager, and as manager of hose sales and had been on special sales assignments the last two years. He is a graduate of Heidelberg University.

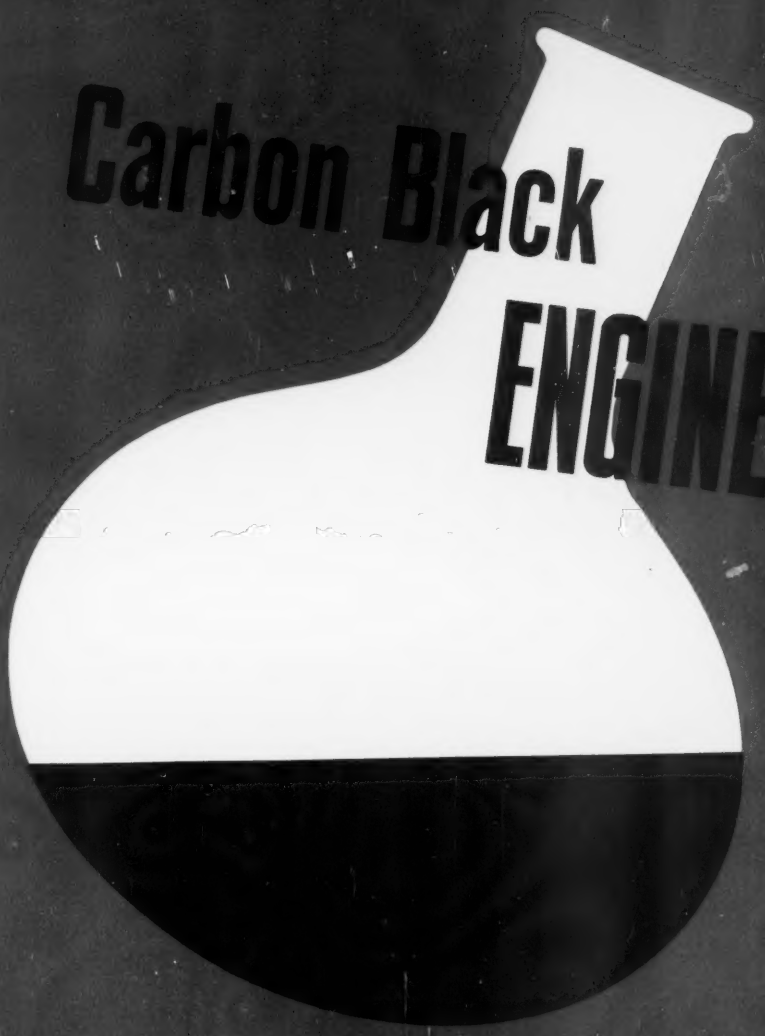
U. S. Rubber Personnel Changes

Appointment of Henry A. Rome as manager of special products sales, William C. Hall as manager of molded goods sales and Thomas S. Savoury as manager of flooring sales has been announced by the Mechanical Goods Division of the U. S. Rubber Co., New York 20, N. Y. Mr. Rome will supervise sales of lathe and wrapped goods, extrusions, hand made rubber tubing, Uskon conductive rubber, industrial products and specialties made of Enrup, the company's new thermosetting plastic. Mr. Hall will supervise sales of light molded goods such as biologicals and pharmaceuticals, milking machine parts, diaphragms, electrical plugs, molded gaskets and seals. Mr. Savoury will be in charge of sales for sheet flooring, stair treads, rubber matting and other flooring specialties. All three men have their headquarters in the company's Passaic, N. J., plant.

St. Clair Constructs Warehouse

St. Clair Rubber Co., Marysville, Mich., is constructing a modern 16,000 square foot warehouse as an addition to company facilities. The new warehouse will be complete with a modern truck loading dock.

Carbon Black ENGINEERING...



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Malayan Section of IRI Formed

The Malayan Section of the Institution of the Rubber Industry was recently formed in Kuala Lumpur for the promotion of rubber technology. The new section will endeavor to encourage close liaison between producer and consumer and to provide an active center for the discussion of mutual problems. One important function of the section will be to organize courses in rubber and latex technology eventually offering degrees in these subjects. The section will not overlap existing planting organizations. The proposed charter excludes purely planting questions from its sphere. The section's first chairman, W. W. Marsh, said that technical control of production on plantations is sadly lacking. Large sums of money are being spent on natural rubber development schemes, but research results will remain an academic interest unless they are applied on an industrial scale in the production of raw materials and their subsequent processing. "It is essential that those concerned in the actual production of raw rubber and latex should have at least an elementary training in the technology of the materials they handle," Mr. Marsh said. The Malayan Section of the Institution was formed largely through the efforts of Dr. R. G. Newton, one of Malaya's leading technologists.

1950 Automobile Facts Yearbook

The 1950 edition of Automobile Facts and Figures, the 30th edition to date, has been issued by the Automobile Manufacturers Association, New Center Building, Detroit 2, Mich. Replete with the usual statistical data on the automotive industry, the current edition indicates that selling new and used cars, tires, batteries, petroleum products, and other automotive equipment has developed into a $25-billion-a-year industry. Automotive sales now account for better than 20% of all U. S. retail trade, with more than 435,000 business concerns taking care of the volume. All-time peaks were reached during 1950 in production, car and truck registrations, gasoline consumption, motor vehicle mileage travelled, and in tax revenues generated by the industry. Copies of the 1950 Automobile Facts and Figures are available from the A.M.A. on request.

Vinyl-Hesive Emulsion

Thomas W. Dunn Co., New York 7, N. Y., has developed a new adhesive for bonding flexible vinyl sheeting to such porous surfaces as paper, pressboard, cardboard, masonite, felt, etc. Named "Vinyl-Hesive," the product is a water-thinnable emulsion that can be applied either by brushing or with conventional equipment. When dry, the adhesive is resistant to aliphatic hydrocarbons, oils, greases and water. The non-staining properties of the adhesive are reported to reduce rejects to a minimum when laminating vinyls to surfaces. Vinyl-Hesive is relatively non-toxic.

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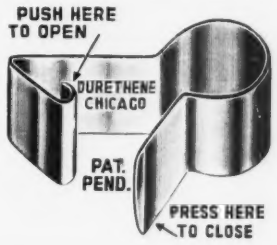
Durathene Bag Band Closure

Durathene Corp., Chicago 50, Ill., has developed a new bag band closure made of stainless non-rusting spring steel. The



closure is especially designed for use with polyethylene bags. After the housewife has opened a heat-sealed polyethylene bag, she may re-use the bag by closing it with the Durathene bag band. The product

handles a wide range of bag sizes, and no tools are needed to put it on or remove it. Durathene produces flat and tubular polyethylene film for bag manufacturers.

Another DuPont Nylon Plant

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has taken an option on a tract of approximately 635 acres on the Neuse River between Kinston and Graingers, N. C., for the site of a new nylon plant. Approximately 1,200 persons will be required to operate the plant when completed. Construction is expected to begin early next year. Approximately 18 months will be required for completion after start of construction. The plant will be DuPont's fourth nylon yarn installation, and the ninth major expansion of its nylon manufacturing facilities after World War II.

Baker Technical Staff Changes

Increased emphasis on technical activities and expansion of the research staff of the Baker Castor Oil Co. has necessitated a division of responsibility within the Technical Division. Under the expansion, Donald S. Bolley has been appointed director of research. M. Kent Smith, formerly director of chemical development for the company, has been named director of development. Russell Hayes has been named chief of the Engineering Department.

U. S. Tightens Tire Export Ban

Several types of tires and tubes have been added to the list of commodities requiring validated export licenses for shipments to all countries except Canada, the Office of Industry and Commerce of the U. S. Department of Commerce announced on September 21. Commodity descriptions covering several other types of pneumatic tires and tubes also have been revised. Some of the revisions have the effect of deleting certain items from the "Positive List," while others place additional destination controls on some tires and tubes. Commodity descriptions of the tires and tubes to which the new destination controls apply are: farm tractor and implement casings with cross-section of 7.00 and over; industrial casings, all sizes with 12.00 cross-section and over and all sizes of 10.00 to, but not including, 12.00 cross-section and over, and all sizes of 7.00 to, but not including, 10.00 cross-section with 12-ply rating and over; industrial casings of 10.00 to, but not including, 12.00 cross-section with 12-ply rating or less, and 7.50, but not including, 10.00 cross-section with 10-ply rating; farm tractor and implement inner tubes with 7.00 cross-section and over. Details of these actions may be secured from Department of Commerce field offices.

Conner Retires From Goodrich

Chester F. Conner, manager of Industrial Products Sales of the B. F. Goodrich Co., recently retired from active duty with the company after more than 40 years of service. Mr. Conner completed 40 years with the company last March, all in industrial product sales. A graduate of the University of Akron, he started as a sales correspondent. Transferred to the Boston district in 1916, he became assistant district manager there four years later and in 1923 returned to the Sales Promotion Department at the company's Akron headquarters. Named manager of sales promotion in 1932, Mr. Conner was later manager of distributor sales and merchandise manager before being named to his last post two years ago. A recognized authority on industrial rubber products, Mr. Conner served on the advisory staff of the rubber director's office in Washington, D. C., during World War II and has been prominent in mill supply organizations.

Urges German Plant Reactivation

Harvey S. Firestone, chairman of the Firestone Tire & Rubber Co., recently urged that the German synthetic rubber plants be reopened to help the United States meet military and civilian needs. Mr. Firestone suggested that "the United States go all out to produce maximum quantities of synthetic rubber." He estimated that reopened American synthetic rubber plants would produce 850,000 tons annually by the end of 1950, an increase of 315,000 tons over the anticipated 1950 figure. This, he said, would be about 25,000 tons greater than the peak annual output reached in World War II.

BRPRA ISSUES REPORT ON NATURAL RUBBER RESEARCH ACTIVITIES

The British Rubber Producers' Research Association, 19 Fenchurch St., London, E.C. 3, England, has made available a summary of the report issued by the director of research for 1949. The object of this summary is to briefly outline the main research projects of 1949. Highlights of the summary are presented herewith.

During 1949, one project was directed towards a study of vulcanization with the broad aim of devising methods possessing technical advantages in one or other of several respects. Particular attention was paid to reducing the danger of scorching (premature vulcanization) during the time the compounded rubber is being sheeted, extruded, etc., in the factory. This would be particularly useful in compounds containing the new fine furnace blacks which have been found to greatly enhance the abrasion resistance of GR-S.

Experiments were also carried out leading to vulcanized products which show some point of advantage over those now available, e.g., in resistance to aging, or in strength. The vulcanization project embraced both established and novel methods of vulcanization, and one new method is now being technically evaluated.

Another project was directed to a study of the oxidation of both raw and vulcanized rubber. BRPRA has already done much to clarify the fundamental chemistry of oxidation, but there is still much work of this kind to be done, especially on the oxidation of vulcanized rubber. Work on the oxidation of raw rubber is directed towards three practical objectives of great importance, as follows:

(1) It has long been known that the breakdown of rubber during mastication is dependent on oxygen. Control of breakdown—so essential to the more scientific processing of rubber—therefore implies control of oxidation.

(2) Rubber is known to change its properties to a greater or lesser degree between the time of tapping and that of use by the manufacturer, generally becoming harder and less soluble. Evidence of the nature of these changes is rather scanty, but they are believed to depend essentially on oxygen.

(3) Where unvulcanized rubber is used commercially as such (e.g., in crepe soles), its useful life is dependent on adequate resistance to oxidative degradation.

Work on the oxidation of vulcanized rubber is directed towards the better understanding and control of aging. Improved aging could, in principle, be achieved by the development of either better antioxidants or new methods of vulcanization giving products inherently more resistance to oxidation. At the present time the second line of attack seems more promising.

Latex Problems Studied

Effort both at Welwyn and Kuala Lumpur is being devoted to the study of methods of controlling latex stability, so that while spontaneous coagulation is avoided, it is possible to cream, flocculate, or coagulate the latex according to the needs of the practical problem of the moment. Much of this work is still at the fundamental level, but some interesting pointers have been found which may lead to practical application.

Still another study concerned itself with reinforcing fillers other than carbon black. When it is desired to compound rubber in such a way as to make it harder and stiffer, it is always necessary to sacrifice some of the inherent properties of the rubber, notably its resilience. For many applications carbon black is at present virtually irreplaceable. However, some interesting products have been made in which the filler is either lignin (of which enormous quantities are potentially available at a low price) or a synthetic polymer. Possibilities in this field are being explored. The future significance of this work is as yet difficult to assess.

Rubber in Engineering

Rubber as an engineering material was another problem investigated by BRPRA during 1949. The wide range of mechanical goods in which rubber is used is, of course, a direct consequence of its physical properties and its endurability. Much of the work of the Physics Group of BRPRA is concerned with increasing the understanding of these properties, especially at points where mechanical failures now occur. These are mainly in tearing and in abrasive wear, and fundamental investigations are in hand leading to a clearer picture of the way in which rubber tears and abrades. The latter is especially a notoriously difficult problem, but encouraging progress has already been made.

Still greater use would be made of rubber as an engineering material if its physical properties were (1) more accurately definable in a quantitative sense, and (2) more stable over long periods of time. Important progress has already been made in studies of the elastic behavior of rubber, the outcome of which will be a notable contribution of the first of these problems. Increasing attention is now being given to the application of this new knowledge to the design of practical engineering units, along two lines:

(1) It should, in the future, be possible to design an engineering unit on the drawing board, specifying its dimensions and the characteristics of the rubber, so that the finished unit will have the required overall mechanical properties.

(2) The useful life of a unit is often found in practice to be enormously dependent on small details of design, quite small changes often eliminating a tendency to premature failure through development of cracks at a particular point. By theoretical studies of stress concentration it should be possible to eliminate the guesswork from such design problems.

It has long been urged by technologists that the present visual system of grading raw rubber is of very limited value, and should be replaced by one based on some quantitative measure of the factors which are of importance to the rubber manufacturer. Serious difficulties have, until recently, rendered all such proposals abortive, but energetic attempts are now being made to overcome them.

In this, French producers have taken a lead, and now market a portion of their No. IX sheet marked to indicate both the Mooney viscosity of the raw rubber, and the modulus (at 600% elongation) of a vulcanizate prepared according to a specified recipe. Malayan production is not at present suitably organized for the general introduction of the same scheme, but a large scale investigation is now being undertaken by the Rubber Research Institute of Malaya to determine how best Malaya can begin to produce specified rubber.

This investigation was planned at a conference held in Kuala Lumpur in September, 1949, at which all the natural rubber research institutes were represented. BRPRA is cooperating with the RRI both by the secondment of staff to Malaya and by institution of parallel investigations in its own laboratories.

The ultimate aim of this work is to offer the manufacturer a choice of a number of grades of material differing, in a known manner, in those characteristics which are of importance to him. The more limited immediate objective is to enable him to purchase one or more grades of rubber which will at least be uniform in behavior, both within a single consignment and between consignments of nominally similar rubber. No ideal system of grading can yet be laid down, but it is believed important to take practical steps in this direction with a minimum of delay.

Once scientific control of production can be established, the way will be open to the progressive improvement of the product itself and in the service which producers can offer to manufacturers. A most important link will have been forged in the chain which ultimately connects producers, both through their research associations and directly with customers.

Development Projects

The object of development work is to translate ideas from the laboratory into commercial production. The final stage can only be undertaken by the manufacturer, but the very essential intermediate pilot plant stage seems a legitimate and necessary adjunct to the Research Association. In the past, the BRPRA has frequently felt the need for such facilities and steps have now been taken to provide them. This has involved the creation of a new organization, to be known as Rubber Technical Developments, Ltd., for which the BRPRA shares responsibility with the British Rubber Development Board. The main development projects to be taken over immediately include:

Positex. This material (a positively charged latex) is now in commercial production, but the BRPRA continues to give a good deal of technical assistance. The following applications appear particularly promising: Woolen fabrics which show good wear and absence of piling; im-

proved wear and reduced shrinking of Positized socks; development of an unwoven cotton fabric; the use of Positex to produce a design on knitted fabric by printing and raising; carpets made up from Positized pile yarn.

Latex Casting. Important progress has been achieved in extending the scope of this technique for the manufacture of hard non-brittle objects, both in the laboratory and by firms to whom BRPRA has given technical assistance. These efforts have contributed notably to commercial developments in the United Kingdom.

Latex Protective Films. The process, worked out in collaboration with the Chemical Research Laboratory, for the application of latex protective films to metal objects, has now been largely handed over to suppliers of compounded latices. BRPRA expects to be called on for technical assistance for some time yet, and it is too early to predict the probable market.

Footwear. Investigations are in hand, in close touch with the Boot & Shoe Research Association, to develop new applications of rubber in footwear.

Flooring. Investigations are in hand to develop rubber floorings of the linoleum type.

In addition to these main projects, the development unit handles a very wide range of technical queries from actual or potential rubber users.

Another Firestone Tire Plant

Construction of a $5,000,000 additional tire plant at Des Moines, Iowa, in order to keep pace with increased demand, has been announced by the Firestone Tire & Rubber Co. It is expected that the new tire plant will be in production in the early spring of 1951. New warehouse facilities are already under construction. The present Firestone plant at Des Moines is said to be one of the most modern in the rubber industry. The new plant will also have the latest improvements in efficient production equipment. The Des Moines plant was built by Firestone for the Government in 1944 for the production of tractor and heavy duty truck tires for the armed services. After the war the company continued to operate the plant under lease from the Government until 1946 when it purchased the property. In addition to Des Moines, other company tire plants about the country have been operating at capacity for many months.

P-80 Rubber Lubricant

International Products Corp., New York & Ferrier Avenues, Trenton, N. J., has announced the development of P-80 Rubber Lubricant, which, when diluted with water, forms an emulsion which is a specific lubricant for rubber. It is said to make a fine cutting lubricant for trimming and die cutting operations and to greatly facilitate the assembly of rubber components such as channels, grommets and insulated wires. P-80 Rubber Lubricant does not swell or deteriorate either natural or synthetic rubber and is harmless to hands and equipment.

Seal-Test Water-Proofing Kit

New England Products, Inc., 761 Park Avenue, Cranston, R. I., has placed a new water-proofing kit upon the market which incorporates liquid latex as the sealing agent. Especially developed for automotive use, the Seal-Test Latex Rubber Automotive Water-Proofing Kit includes three basic materials for the complete

waterproofing of windows, doors, vents, etc., on an automobile. The first of these materials, the Seal-Test Primer, is an all-purpose, water-proof latex rubber adhesive. It is used alone and as a primer or base coat for Seal Test Fluid Rubber. This latter material is a latex rubber compound which is applied in liquid form and which dries into solid, elastic natural rubber. The Seal-Test Dryer is used to dry the fluid rubber and to prevent it from sticking. The kit comes complete with a pressure caulking gun, brushes, applicators and nozzles for various parts of the automobile.

Increases Acrylonitrile Output

An expansion program for Monsanto Chemical Co. at its Texas City, Texas, operations, totalling in all its ramifications approximately $30,000,000 over the next few years, was recently announced. The new program involves chiefly the production of acrylonitrile and related chemicals by a process direct from acetylene. Acrylonitrile is an important ingredient in synthetic fibers, plastics and nitrile rubber. Construction of facilities is expected to begin immediately at the present styrene manufacturing location at the Texas City plant. Upon completion, these facilities will nearly double the size of the present plant. The expanded facilities will operate under the present plant management.

DuPont Expands Neoprene Output

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has announced plans for a substantial increase in the capacity of its Louisville, Ky., plant to make neoprene. The increase will be accomplished both by substituting larger equipment for existing facilities in some manufacturing processes and by new construction. Some new equipment is presently being installed with new construction scheduled within the next few months. The peak construction force is expected to be 250 to 500 men. The plant has a present rated capacity of 60,000 long tons of neoprene a year.

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JULY CASING SHIPMENTS RISE 18.11% ABOVE TOTALS IN JUNE

Shipments of automotive casings in July, 1950, totaled 12,040,389 units, 18.11% more than the 10,194,011 casings shipped in the previous month, according to recent estimates of the Rubber Manufacturers Association. In July, 10,421,758 passenger casings and 1,618,631 truck and bus casings were shipped, against the 8,795,891 passenger and 1,398,120 truck and bus casings shipped in June.

Total production of automotive casings, however, dropped 2.42% with 8,263,546 units produced during the month compared with the 8,468,710 casings produced in June. A total of 7,103,496 passenger casings were produced in July, against the 7,299,334 produced in the previous month. Truck and bus casings produced in July totaled 1,160,050 units, against the 1,169,376 produced in June.

As of July 31, 1950, there were 7,004,700 automotive casings on hand, of which 5,690,302 were passenger casings and 1,314,398 were truck and bus casings. At the end of June, there were 10,748,707 automotive casings on hand, of which 8,973,878 were of the passenger type and 1,774,829 were truck and bus casings.

A total of 9,629,335 passenger and truck and bus tubes were shipped during July, contrasted with the 8,458,809 tubes shipped during June. In July, 6,916,496 tubes were produced, against the 7,536,925 tubes produced during the previous month. At the end of July, 8,422,233 tubes of all types were on hand, while at the end of June, 11,248,213 tubes were on hand.

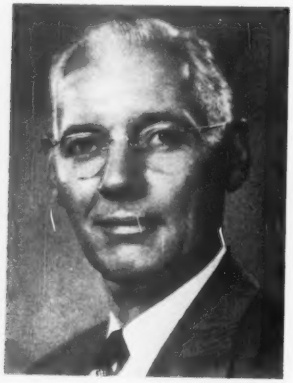
Comments on Stockpile Picture

The Government won't have anywhere near the trouble today, in building a rubber stockpile, that it had 10 years ago, according to Harold Gray, technical superintendent of the Tire Division of the B. F. Goodrich Co., Akron, Ohio. One of the reasons, he said, is that pound for pound rubber goes farther today than it did in 1940. Rubber products still take as much rubber as they used to, he pointed out, but research and development in the past decade has lengthened the service life of both crude and synthetic rubber products. Among the improvements which have arisen in the past 10 years are "cold rubber" and specialty synthetics which are "tailored" for specific purposes, Mr. Gray said. Insofar as tires are concerned, improved design has materially contributed to reduce the rate of wear.

American Anode Buys New Plant

American Anode, Inc., Akron 8, Ohio, a division of the B. F. Goodrich Co., has purchased the Wayne Knitting Mills Plant at Riverside, N. J. The present facilities of the plant will be increased to manufacture latex products and will be in operation by June, 1951. Products and materials in which synthetic rubbers are used will be produced at the Riverside plant. When in full operation the plant will employ more than 200 persons.

Collins Plans European Survey



D. F. Collins

D. F. Collins, a research and development engineer for the Adamson-United Co., Akron 4, Ohio, was scheduled to leave the United States in mid-October for an extensive trip to industrial machinery plants in England, France, Italy, Holland and Belgium. Mr. Collins plans to study the latest European developments in mixing and milling equipment for the rubber and plastics industries, particularly those reported to be distinct departures from methods presently employed in this country. He will spend considerable time in England where great strides are reported to have been made in the development of continuous internal mixing and milling machinery. Mr. Collins' overseas assignment is a furtherance of a working arrangement already in effect between Adamson-United and several European manufacturers. A graduate of Tri-State College, Angola, Ind., Mr. Collins has been associated with Adamson-United for the past three years.

Honor General Tire Founders

Three hundred distributors of the General Tire & Rubber Co. converged on Akron on September 27 to pay special tribute to William O'Neil, president, and his four original associates in the company—W. F. Fouse, C. J. Jahant, Robert Iredell, and H. B. Pushee. The celebration was held on the eve of the company's thirty-fifth anniversary. Highlite of the affair was an elaborate banquet staged at the Hotel Mayflower. The dealers traveled to Akron at their own expense and paid $25.00 each for their dinners. A bronze plaque was presented to the tire company founders.

Correction

A recent item in our "News in Brief" page stating that DuPont had issued a number of Chrysler specifications was not strictly correct. DuPont is not distributing the specifications themselves, but rather has prepared leaflets (G Sheets Nos. 118-22) which give compounding information that will help suppliers meet the requirements of Chrysler specifications for products made of neoprene.

LABOR NOTES

The URW is currently waging a fight for higher pay on at least six fronts. Wage talks with Goodyear, interrupted by the holding of the union's 15th annual convention, were resumed in Cincinnati on September 26. Similar talks were scheduled to be held with Goodrich, U. S. Rubber and Firestone. Talks are scheduled to start with General Tire later this month, while negotiations are being conducted with Seiberling Rubber to agree on a bargaining date.

Over 175 employees at two plants of the Pyramid Rubber Co. in Ravenna, Ohio, went on strike on September 27 following a special meeting of the union local. Union officials indicated the dispute partly concerns wages, but would give no indication of any increase requested. It was emphasized, however, that the union has no complaints concerning working conditions in the plant.

The 67-day strike at the plant of the Diamond Alkali Co. in Painesville, Ohio, was ended on September 27 following ratification by District 50 of the United Mine Workers of a new three-year labor agreement. The agreement included a 10 cents-an-hour pay boost, with additional wage increases of 5 cents-an-hour in 1951 and 1952. Cost of the new agreement was estimated by the company at approximately $3,750,000 over the three-year period.

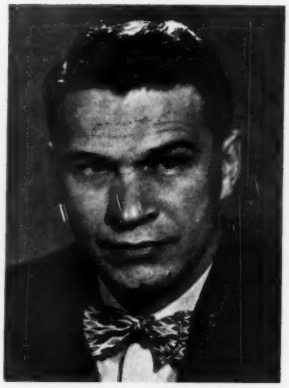
An election to determine whether the employees of the U. S. Rubber Co. at its Providence, R. I., plant will be represented by affiliates of the CIO or AFL has been ordered by the National Labor Relations Board. Both production and maintenance employees are involved. They will be instructed to vote for one or the other of the unions involved.

A two-day wildcat strike at the plant of the Mohawk Rubber Co. was ended on September 15 when workers returned to the plant following a recommendation of the Mohawk local. More than 600 workers were idled by the walkout which began in the mill room when workers protested against what they termed "wage inequities." The union has asked that a piece-work rate be established.

Agreement on a pension program and collective bargaining agreement was recently reached between officials of the URW local and the Mansfield Tire & Rubber Co. The health and welfare program, calling for pensions ranging upward from $100 a month, will cover more than 2,000 workers at the Mansfield plant. It is the first pension program ever negotiated with the company.

The serviceability of fabrics is the subject of a technical bibliography recently compiled by the Philadelphia Quartermaster Depot and available from the Office of Technical Services, Department of Commerce, Washington, D. C. It provides descriptive references on 168 studies.

Named Production Superintendent



Raymond L. Fitz

Raymond L. Fitz, associated with the B. F. Goodrich Co. since 1940 has been appointed production superintendent in the Processing Division of the company. Mr. Fitz will have charge of production in the rubber preparation, compounding, mixing, milling and calendering departments at Plants 1 and 4 in Akron. A graduate of the University of Dayton as a chemical engineer, Mr. Fitz has served in the Processing Division since he joined the company in 1940. He became a general foreman in the reclaim plant in 1941 and served in that capacity until 1946 when he was made production manager of the calendering departments of the Processing Division, a post he held until his recent appointment.

Investigate Carbon Black Deaths

An investigation has been launched in the mysterious death by suffocation of three men in one of the carbon black storage tanks of the General Tire & Rubber Co. in Akron which occurred on September 26. Two other men were nearly suffocated and were in serious condition. Two of the deaths and the two near-fatalities resulted from rescue efforts. As nearly as can be determined, William J. Smith, an employee of the Link Belt Co., who was aiding in the installation of a conveyor belt on the factory roof near the top of the carbon black tank, decided for some unknown reason to enter the tank through the conical top. When he failed to reappear after several minutes the other men, one by one, three of them General Tire employees, went into the tank bent on rescue with the tragic result indicated above. The deaths are believed to have resulted from fumes, possibly carbon monoxide, from the carbon black, or a combination of fumes and fine carbon black dust in the tank. Blood samples have been sent to the laboratories at Western Reserve University for analysis.

An index to Volume 67 of RUBBER AGE will be found on Pages 121 to 124 of this issue.

ASME RUBBER-PLASTICS GROUP HOLDS MEETING IN WORCESTER

The Fall Meeting of the Rubber and Plastics Division of the American Society of Mechanical Engineers was held at the Hotel Sheraton in Worcester, Mass., on September 19, in conjunction with the regular meeting of the parent society. Two sessions were held, three papers being presented at the morning session and two at that held in the afternoon, the latter held jointly with the Textile Division of the society.

Approximately 25 members and guests attended the morning session and approximately 45 were present at the afternoon session. John T. Blake (Simplex Wire & Cable) presided as chairman at the morning session, with George S. Laaff (Bolta) acting as vice-chairman, while Horace Gooch, Jr. (Worcester Moulded Plastics) was chairman at the afternoon session, with Paul B. Leverette (Parkwood Corp.) as vice-chairman. A meeting of the Executive Committee of the division was also held.

Shear Properties of Polymers

The first paper at the morning session was on "Dynamic Shear Properties of Rubberlike Polymers," by I. L. Hopkins of the Bell Laboratories, Inc., New York. In his talk Dr. Hopkins appraised a simple apparatus, developed by Roerden and Grieco, for determining the dynamic properties of elastomers in shear at audio frequencies. He gave typical values of shear modulus and viscosity for several elastomers, both at room conditions and at 150° F. The frequencies of test ranged from 100 to 5250 cycles per second, the shear moduli from 0.5×10^8 to 480×10^8 dynes per square centimeter, and the viscosities from 20 to 75,000 poises.

In a summary of the talk, Dr. Hopkins pointed out that while the precision of the method is not high, its simplicity and possible frequency range, which has not been exhausted in the present tests, and its yielding of data in terms of shear properties recommend it for exploratory measurements. The precision of the test was questioned in written discussion submitted by James Lyons of the Firestone Tire & Rubber Co.

A paper on "Comparative Strengths of Some Adhesive-Adherend Systems," prepared by N. J. DeLollis, Nancy Rucker, and J. E. Wier, of the National Bureau of Standards, was presented by Mr. DeLollis. The adhesives covered included polyvinyl acetate, cellulose nitrate, resorcinol resin, casein, gum arabic, natural rubber, and neoprene, the adherends being stainless steel, aluminum alloy, paper-phenolic laminate, glass, birch wood, and hard rubber. The properties studied were double-lap shear, tensile, long-time loading shear, and impact strength.

The investigation indicated that the tensile-adhesion and shear strength values for a given adhesive-adherend combination did not differ greatly except for wood and paper-phenolic laminate, the highest values being obtained with polyvinyl acetate and cellulose nitrate adhesives. The thermosetting resorcinol resin showed no appreciable flow in supporting a load of 680 lbs./sq. in. for six months, whereas the thermoplastic polyvinyl acetate failed in 45 days under a load of 200 lbs./sq. in. The rubber-type adhesives, which were weak compared with the other adhesives in the static load tests, were definitely superior in the impact tests.

Rubber-Phenolic Materials

The concluding paper at the morning session was on "Rubber-Phenolic Molding Materials," presented by Wyman Goss, Chemical Division, General Electric Co., Pittsfield, Mass. Mr. Goss stated that since standard impact tests do not properly illustrate the abuse resistance of rubber-phenolic materials the General Electric laboratories made simulated drop hammer tests on identical moldings from both phenolic and rubber-phenolic formulations containing various fillers, including wood flour, cotton flock, fabric and asbestos fiber.

Mr. Goss described the tests in detail and reported the results, the data indicating that the rubber-phenolic materials withstand shock loads of from 1½ to 8 times greater than phenolics alone before first signs of failure and that they withstand shock loads of from 2 to 15 times greater than straight phenolics before complete failure.

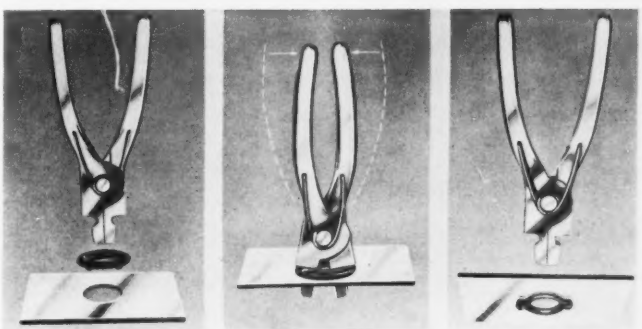
The two papers at the afternoon session were "Plastics in the Textile Industry," given by F. P. Hunsicker, of the Westinghouse Electric Corp., Boston, Mass., and "Industrial Applications for Nylon Plastics," presented by W. C. Wall, of E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware, who substituted for J. E. Teagarden of the same company, the scheduled speaker. Both talks were illustrated by numerous slides and charts, and both authors showed vast numbers of finished products. Considerable floor discussion followed the talks.

The next meeting of the ASME Rubber and Plastics Division will be held at the Hotel Statler in New York City on November 30-December 1 in conjunction with the annual meeting of the parent society. Details on the program for the next meeting appear elsewhere in this issue.

Labeling Funds Appropriated

The Informative Labeling Committee of the Society of the Plastics Industry, Inc., New York 17, N. Y., has set aside a special appropriation to cover the cost of an expanded and intensified promotion program on informative labeling. The funds were specifically earmarked for promotion and publicity to educate the plastics industry with regard to informative labeling. All activities relative to the program will be carried out by the Subcommittee on Promotion of Informative Labeling under the chairmanship of Amos Ruddock, plastic merchandise manager of the Dow Chemical Co., Midland, Mich. Elmer French, general sales manager of the Firestone Plastics Co., Akron, Ohio, is chairman of the Informative Labeling Committee. The ultimate goal of the committee is an industry-wide informative labeling program that would see plastic products identified not only by brand but on a basis of performance, composition and construction.

AUTOMOTIVE RUBBER ANNOUNCES RUBBER-COVERED "STA-PUT" GROMMET



Automotive Rubber Co., Inc., 8601 Epworth Blvd., Detroit 4, Mich., has announced the development of a new metal formed grommet which is completely covered with rubber. Called the Arco "Sta-Put" Series 3120, the grommet is designed for insulating blanked holes in metal to prevent cutting, chafing, shorting and rattling of wires, cables, conduit, etc., which pass through the holes. The company states that the grommet can be installed easier and faster than previously offered types and that it holds in position at all times. Regardless of the amount of motion or vibration in the part that passes through the hole it will not loosen or pull out exposing the sharp edges of the blanked metal. Installation from the face of the hole is another feature of the Sta-Put grommet. An expanding hand tool made available by the company is used to roll and force the curled prongs tight against the under-surface.

NAMES IN THE NEWS

GEORGE S. LAMSON, manager of the Automotive Replacement Division of the Thermoid Co., Trenton, N. J., has been elected a vice-president of the company.

WALTER A. WAKE, formerly chief chemist of the Whitehead Bros. Rubber Co., has joined the New York Rubber Corp. at Beacon, N. Y., in a similar capacity.

B. R. HUBBARD, previously technical coordinator of the Whitney Blake Co., Hamden, Conn., has joined John A. Roebling's Sons Co., Trenton, N. J., to head up that company's technical rubber activities.

DR. E. E. MCSWEENEY, in addition to his duties as director of plastics, rubber and coatings research for Battelle Memorial Institute, will direct relations between the Institute and sponsors in industry. He will also assist prospective sponsors of research in setting up their research programs.

ROBERT J. GANDER, formerly director of the research group at the Pottstown, Penna., plant of the Firestone Plastics Co., has joined the research staff of Johnson & Johnson at New Brunswick, N. J.

FRANK R. MAYO, who recently resigned as head of the fundamental organic research department of the general laboratories of the U. S. Rubber Co., has joined the research laboratory of the General Electric Co. at Schenectady, N. Y., as a research associate.

JOHN A. GARMAN, formerly a member of the research group at the Pottstown, Penna., plant of the Firestone Plastics Co., is now a member of the research and development laboratories of U. S. Industrial Chemicals, Inc., at Baltimore, Md.

D. A. READY, formerly associated with the Barrett Division of Allied Chemical & Dye Corp., has joined the chemical division of the Borden Co. at Philadelphia, Penna.

WILLIAM I. CALDWELL, associated with the Research Department of the Taylor Instrument Companies, Rochester, N. Y., since 1937, has been appointed director of research for the company, succeeding NATHANIEL B. NICHOLS, who has accepted a position as Professor of Electrical Engineering at the University of Minnesota.

BERT S. TAYLOR, formerly factory manager of the Plastics Division of the B. F. Goodrich Co., has joined Ohio-Apex, Inc., Nitro, W. Va., as manager of the Development Department.

W. J. MOORE, formerly assistant factory manager of the Mohawk Rubber Co., Akron 5, Ohio, has been named factory manager of the company's new plant in Littleton, Colorado.

D. W. HOLMES, formerly general sales manager of the Parker Appliance Co., Cleveland 12, Ohio, has been elected vice-president in charge of sales for the company.

JAMES E. CALDWELL, assistant comptroller of the Goodyear Tire & Rubber Co., has been named a member of the National Committee on Education of the National Association of Cost Accountants.

RAYMOND D. WHITCOMB has been named as sales representative in the Northern Illinois-Southern Wisconsin area by Sprout, Waldron & Co., Inc., Muncy, Penna., serving the process industries.

RAYMOND L. FITZ, formerly production manager of the Calendering Departments of the Processing Division of the B. F. Goodrich Co., Akron, Ohio, has been appointed production superintendent of the Processing Division in charge of rubber preparation at Plants 1 and 4 in Akron.

F. B. BABCOCK, technical consultant to the Firestone Tire & Rubber Co., Akron, Ohio, was recently awarded an honorary doctor of science degree from his alma mater, Colgate University, Hamilton, N. Y.

WILLIAM L. CARPENTER, previously assistant to the general manager of tire operations of the B. F. Goodrich Co., has been named production manager of the company plant at Miami, Okla.

J. CHESTER RAY, formerly sales manager for U. S. Tires of the U. S. Rubber Co., has been appointed sales manager of dealer brands produced by the company's Tire Division.

DR. HERMAN F. MARK, director of the Institute of Polymer Research at the Polytechnic Institute of Brooklyn, has been awarded the honorary degree of doctor of engineering by the University of Liege in Belgium.

MAYNARD C. WHEELER, vice-president in charge of production of the Commercial Solvents Corp., New York 17, N. Y., has been elected to the corporation's board of directors.

RICHARD J. BROWN, formerly associated with the Rex Corp., Cambridge, Mass., has been appointed to the Development Department of the Russell Manufacturing Co., Middletown, Conn., where he will be concerned with plastics research.

RICHARD LEWISOHN, JR., associated with the American Lead Pencil Co., Hoboken, N. J., since 1937, has been named president of the company, succeeding the late JOSEPH J. RECKFORD. At the same time GEORGE J. GRUMBACH was named vice-president and JEROME F. SCHOSS was appointed secretary-treasurer.

A. F. CARR, former plant superintendent of the Airlastic Rubber Co., Chicago 22, Ill., has been appointed manager of the rubber division of the Felt Products Manufacturing Co., Chicago 7.

BEN R. PERCIN, active in sales work for many years, has joined the Rubber Corporation of California as sales manager.

GEORGE DAWSON, associated with A. G. Spalding & Bros., Inc., since 1936, has been appointed assistant to the president of the company.

E. M. EICKMAN, formerly South American Division manager of the Goodyear Export Co., has been named assistant manager of the Aviation Products Division of the Goodyear Tire & Rubber Co.

H. R. MACK, associated with the U. S. Rubber Co. since 1937, has been appointed sales field manager of the Tire Division with headquarters in New York. J. S. BERRY, since 1949 district manager for U. S. tires at St. Louis, Ill., has been named manager of truck tire sales succeeding Mr. Mack.

ROBERT A. WINTERS, executive director of the Rubber Heel & Sole Institute, New York 17, N. Y., has been appointed to the Committee on Accident Record, Analysis and Use of President Truman's Conference on Industrial Safety.

JAMES A. COOPER, associated with the B. F. Goodrich Co. for the past 7 years, has been appointed manager of field sales for Koroseal upholstery materials with headquarters at the company's plastic plant and offices in Marietta, Ohio.

DR. W. EDWARD HIGBEE, well-known in the rubber and related industries, has been appointed director of research of Testworth Laboratories, Inc., Chicago 5, Ill.

A. J. SMITH, recently named treasurer of J. P. Stevens & Co., New York 13, N. Y., has been elected president of the New York Credit Men's Adjustment Bureau, Inc., an affiliate of the New York Credit & Financial Management Association.

OWEN J. BROWN, JR., vice-president and general sales manager of Godfrey L. Cabot, Inc., Boston 10, Mass., has been elected to membership in the Tufts Alumni Council of Tufts College, Medford, Mass.

L. DOUGLAS WEIFORD, in charge of government relations for the Stauffer Chemical Co., has been transferred from the New York office to Washington, D. C., where he will handle sales development work in adjacent states as well as his other duties.

JOSEPH A. PAYETTE, formerly manager of farm tire sales to original equipment accounts of the U. S. Rubber Co., has been appointed manager of field sales for the Manufacturer's Sales Division, with headquarters in Detroit, Mich.

Brown Named Chief Engineer

J. Scott Brown

J. Scott Brown, associated with the Naugatuck Chemical Division of the U. S. Rubber Co. since 1942, has been named chief engineer for the division. Mr. Brown will supervise engineering operations in the synthetic rubber plants operated by the division in Naugatuck, Conn., Port Neches, Tex., and Borger, Tex. He will also supervise engineering activities in the Marvinol vinyl resin plant at Painesville, Ohio, and the Naugatuck Chemical plant at Naugatuck, Conn. Mr. Brown first joined Naugatuck as a mechanical engineer in the Explosives Department in April, 1942. He became chief maintenance engineer of the Explosives Department in March, 1943. In February, 1944, he became plant engineer of the synthetic rubber plant at Naugatuck, Conn., and in November, 1945, plant engineer of the Naugatuck chemical plant. Prior to joining U. S. Rubber, he was employed by the Carbide and Carbon Chemical Corp. and the Blaw-Knox Co.

Producing Naugahyde Covering

U. S. Rubber Co., New York 20, N. Y., is now producing vinyl plastic Naugahyde wall covering for use in hospitals, hotels, restaurants, clubs, theaters, offices, institutions and homes. The wall covering has a tough special backing which is said to give it stability in hanging. It can be applied with conventional adhesives on most wall surfaces. It has a smooth, fine textured grain and is highly resistant to abrasive wear, scuffing and gouging. It will not become brittle or chip, retains its color and texture, and can be washed with soap and water. Naugahyde wall covering has been used for the last three years by a national chain store for counter fronts and wall surfaces. The product is made in 30-yard rolls, 50-inches wide, in 12 colors including seven popular pastel shades and five deep tones. Richard E. Thibaut, Inc., has been named sole distributor in New York, New Jersey and New England, with other distributors to be announced at a later date.

Phillips Forms Rubber Division

Phillips Chemical Co. has announced the formation of a Rubber Division to operate the Government-owned synthetic rubber plant at Borger, Texas. Phillips operates the adjoining Plains butadiene plant, which the company designed and built for the Government during World War II. The Reconstruction Finance Corp. recently turned over the operation of the Borger synthetic plant to Phillips. The new Rubber Division will operate the consolidated plants. The key men supervising both plants include: W. C. Hewitt, plant manager; Austin Morgan, services superintendent; G. H. Short, manufacturing superintendent, and L. M. Fairman, industrial relations superintendent. It was also announced that the company will soon begin construction of an additional plant for the production of Philblack O, the high abrasion furnace black. The plant will be built adjacent to the present Philblack A and O plants in the vicinity of Borger. Completion of the new black plant is scheduled for 1951.

Indian Rubber Industry Grows

Recent dispatches have advised that Indian firms are experimenting with the manufacture of new lines of rubber goods as a result of the increase in raw rubber production in recent years. A first grade quality ebonite, used for electrical purposes, is now being made and it is estimated that the industry will be able to meet the demand of 50 tons a year. Previously, ebonite had been imported from the United Kingdom. A concern in Calcutta is producing factice, an essential material in the processing of raw rubber, and another is being set up for the manufacture of latex foam sponge to be used in upholstery. According to the Indian Rubber Board, which is concerned with the development of the industry as regards production and marketing, there are 167,000 acres under cultivation. Of these, 73% are in Travancore, 16% in Madras and 8% in Cochin. Rubber is also grown in Coorg, Mysore and Assam. There are over 13,800 estates in the country.

FINANCIAL NEWS

American Hard Rubber Co.

Twenty-Eight Weeks to July 16: Net income of $282,102, which is equal to $2.49 a share, contrasted with a net loss of $265,819 for the comparable period of 1949. Net income for the year ended July 16, 1950, amounted to $273,186, which is equal to $1.79 a share, compared with a loss of $28,866 for the previous year.

Faultless Rubber Co.

Year to June 30: Net profit of $405,001, which is equal to $3.09 a common share, compared with $365,683, or $2.79 a share, in the previous fiscal year.

Joins Technical Sales Staff

James H. FitzGerald

James H. FitzGerald, formerly associated with the B. F. Goodrich Co., has been appointed to the technical sales staff of the Harwick Standard Chemical Co. with headquarters in Boston, Mass. While with Goodrich, Mr. FitzGerald was engaged in testing and development as well as evaluation of raw materials for rubber compounding. He also served as a chemist on factory processing and control of molded and extruded goods at the Cadillac plant. Mr. FitzGerald is a graduate of the Massachusetts Institute of Technology with a degree in chemical engineering. A member of the American Chemical Society, he has been active in the Rubber Division and at present is connected with several rubber groups in the New England area.

Goodrich Answers Folsom Charge

Rising costs of everything that goes into a tire forced the price increases during the past year, said James J. Newman, vice-president of the B. F. Goodrich Co., in answer to Governor James E. Folsom of Alabama who had criticized the four larger rubber firms for raising prices. The Governor complained the companies raised their prices despite the fact there is "no tire shortage." Asking if they were "joining the rest of the monopolies in war profiteering," Mr. Folsom's blast followed almost identical bids submitted by the "Big Four" on tires the State of Alabama is seeking to purchase. The prices were approximately 25% above last year. Mr. Newman wired the Governor that "we quoted prices in accordance with our published price list, in which we have reflected only part of the tremendous increase in the cost of tires which has been imposed upon us." Mr. Newman cited the increase in the price of natural rubber which has risen in price from approximately 19 cents a pound on February 1 to a recent high of 63 cents. He also pointed out that there have been substantial increases in everything else that goes into a tire. "In spite of these increases we have been forced to make, tires still show a considerably smaller increase over prewar than other manufactured products," the wire concluded.

Basic Law for NBS Amended

A new law has been passed by the Congress and signed by the President defining and describing the authorized functions and activities of the National Bureau of Standards. This law, Public Law 619, 81st Congress, approved July 22, 1950, makes clear and explicit the legal basis for NBS activities. The law is primarily an amendment to Section 2 of the Act of March 3, 1901, which established the Bureau. In accordance with the general policy of giving responsibility to secretaries of departments of the Government, the new act assigns functions to the Secretary of Commerce. The act prescribes six functions in general terms, as follows:

(a) The custody, maintenance, and development of the national standards of measurement, and the provision of means and methods for making measurements consistent with those standards, including the comparison of standards used in scientific investigations, engineering, manufacturing, commerce, and educational institutions with the standards adopted or recognized by the Government.

(b) The determination of physical constants and properties of materials when such data are of great importance to scientific or manufacturing interests and are not to be obtained of sufficient accuracy elsewhere.

(c) The development of methods for testing materials, mechanisms, and structures, and the testing of materials, supplies, and equipment, including items purchased for use of Government departments and independent establishments.

(d) Cooperation with other governmental agencies and with private organizations in the establishment of standard practices, incorporated in codes and specifications.

(e) Advisory service to Government agencies on scientific and technical problems.

(f) Invention and development of devices to serve special needs of the Government.

Marshall Buys Ryan Rubber

Albert J. Marshall, formerly associated with the Naugatuck Chemical Division of the U. S. Rubber Co., has assumed the ownership of the Ryan Rubber Co., Dallas, Texas. Mr. W. G. Ryan, former owner of the company, has retired from active administration for reasons of health. He will, however, remain in a sales and advisory capacity. Mr. Marshall entered the rubber field in 1935 upon his graduation from Case Institute of Technology. He was first associated with the Continental Rubber Works of Erie, Penna., as a sales representative and then as sales engineer in the Philadelphia, Penna., branch of the company. In 1936 he was named branch manager in St. Louis, Mo., and in 1937 was appointed branch manager in Cincinnati, Ohio. Mr. Marshall joined the Navy in 1943, and upon release from active duty joined Naugatuck Chemical as representative in the Akron area. He served as manager of the Akron office until September 1, 1950, when he became owner of Ryan Rubber.

Deecy Products Staflex KA

Deecy Products Co., 120 Potter St., Cambridge 42, Mass., is now offering "Staflex KA," a new plasticizer especially developed for the processing of vinyl stocks. The product has been designed to incorporate some of the advantages of the high molecular weight polymerics without the disadvantages of these materials. Staflex KA is a liquid with somewhat higher viscosity than DOP but easily dispensed from drums and dry-mixed with resin. Because of its increased molecular weight, Staflex KA has migration rates considerably less than those of the usual primary plasticizers, the company states. At room temperature, the loss by migration of Staflex KA is close to that of the polymerics. Staflex KA is said to be outstanding for its resistance to light and has excellent outdoor aging qualities. For compounds with a hardness of 90 Duro A or higher, Staflex KA should be used without other plasticizers. When a hardness near 85 or lower is wanted, mixtures of about 70% Staflex KA with 30% of a secondary type generally give the best results, although high loadings of the product can be used.

Easitape Coated Bandaging Aid

Brasel Products, Inc., Batavia, Ill., has introduced a new pliable plastic bandaging tape called "Easitape." The product is not sticky like conventional adhesive tapes and is said to leave no residue or stains. Easitape will completely protect bandaged dressings from oil, water, dirt and other foreign matter. While it appears to be uncoated, it is coated on both sides with compounded Hycar latex, the base material, manufactured by the B. F. Goodrich Chemical Co. This coating enables the tape to seal quickly and remain sealed. Easitape may be washed without loosening the seal.

Flexol Plasticizer DOP-20

According to a recent announcement by the Carbide and Carbon Chemicals Division of the Union Carbide and Carbon Corp., New York 17, N. Y., Flexol plasticizer DOP has been found suitable for use in vinyl plastics which come in contact with many foods. This development is based on results of two-year toxicity tests carried out by the company and studies of the extraction resistance of Flexol plasticizer DOP in vinyl food wrap films. The company recommends its trial in these applications: film wraps for meats, vegetables, cheese, and frozen foods; water and ice bags; milk and beer tubing; intravenous tubing; cap liner stock coatings; coatings for food conveyor belts, and adhesives for food packages. A special grade of Flexol DOP is now being produced in commercial quantities for use in such applications. The new grade, called Flexol plasticizer DOP-20, is said to have the same stability and good low-temperature properties as does the company's regular Flexol DOP.

Plan Instrumentation Symposium

The Agricultural and Mechanical College of Texas, at College Station, Texas, will offer their fifth symposium on "Instrumentation for the Process Industries," on October 11, 12 and 13, 1950. The course will be conducted as a seminar with lectures and discussions on the subject of automatic control. Cooperating with Texas A & M in the presentation of this course will be many industrial concerns manufacturing oil, gas, and chemical products. Manufacturers of instruments and automatic controls, likewise, are taking part by arranging to show educational exhibits, and provide capable lecturers for many of the sessions.

TACKINESS COSTS MONEY!

Reduce tackiness and milling time— with

a new non-coloring, powdered resin that prevents natural and synthetic rubber from sticking to mill rolls.

If tackiness costs you time and money . . . if you want to increase your milling capacity . . . if you've got milling 'headaches' . . . then investigate D-TAC, a new and different product, proved on the production line.

is

EFFECTIVE on natural rubber and synthetic rubbers, particularly highly loaded clay-cold rubber stocks. No apparent effect on cure or physical properties.

EFFICIENT in small quantities. Depending on the degree of tack to be reduced, only 1 to 6 parts on the rubber are required.

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CANADIAN NEWS

A program designed to increase the productive capacity of the government-owned synthetic rubber plant at Sarnia by 20 to 25% was announced last month by Trade Minister C. D. Howe. The program involves the expenditure of approximately $6,600,000, and work is scheduled to get under way as soon as engineering details and design plans can be completed.

The new North Atlantic area war preparedness program is partly responsible for the decision to boost Polymer capacity to a figure far beyond the country's own requirements.

"Although the plant is currently operating at a rate of approximately 130,000,000 pounds of rubber a year," Mr. Howe said, "the high price for crude rubber which has prevailed since early in 1950 and additional military requirements have resulted in a demand for the company's products, from both domestic and foreign sources, far in excess of the company's present productive capacity."

Mr. Howe said the Polymer board of directors had recommended an immediate expansion of the butyl and copolymer rubber plants at Sarnia, as well as the styrene and butadiene units. The government has approved.

"I am pleased to state that no capital advance from the government will be necessary," added the trade and commerce minister, whose personal interest, drive and initiative were no small factors in the establishment of the big composite plant at Sarnia when natural rubber was in short supply during the last war, and who has continued an active interest in Polymer development. "The expansion program will be financed by the company out of its reserves for depreciation and obsolescence and current earnings," he said.

It is expected that the expansion of the butyl and styrene plants will be completed within eight months and the butadiene and copolymer plant extensions within 12 months. Pending completion of the latter unit, the additional styrene output will assist in meeting the increased requirements of the plastics industry in Canada.

The $6,600,000 program will enable the production of butyl rubber, used largely for inner tubes and mechanical goods, and Polysar S type rubbers, used largely for tires, wire, cables, and footwear, to be increased to 36,000,000 pounds and 126,000,000 pounds a year, respectively.

Western Europe is buying all the Canadian synthetic rubber it can get, currently about a third of Sarnia's output, according to J. R. Nicholson, executive vice-president of the Polymer Corporation. Mr. Nicholson, who recently completed a tour of Polymer's offices on the continent, said "the demand for synthetic rubber is on the upswing, but Canada cannot meet orders from new, potential customers." He added that plans for increased production at Sarnia are in the offing.

Union locals of both the Dominion Rubber Co. and Canadian Goodrich are seeking an increase of 31 cents-an-hour in current negotiations. The 31-cent figure represents a request for a 25 cents-an-hour increase across the board, plus 6 cents for differentials. A threatened strike to back wage demands of some 600 employees of the Miner Rubber Co. at Granby was called off last month with the adoption of a new contract granting retroactive pay increases of 5 and 7 cents-an-hour.

Several promotions in the Goodyear Tire & Rubber Co. of Canada were recently announced by C. B. Cooper, general sales manager. E. W. Hayter, formerly in charge of advertising and sales promotion, has been named marketing and advertising manager; A. E. Ross has been appointed assistant manager of the advertising department; W. G. Britt has been named sales promotion manager, and C. R. Little is now supervisor of the mechanical rubber goods department.

Two major promotions in the company have been announced by C. C. Thackray, president of the Dominion Rubber Co., Ltd. H. Wolfhard, general manager of the Footwear Division, and G. B. Rutherford, general manager of the Mechanical Goods Division, have both been elected vice-presidents of the company. They will continue active management of their respective divisions. Mr. Wolfhard is a native of Kitchener, Ont., and started with the company in the footwear plant in Kitchener in 1912. Mr. Rutherford, a native of Manitoba, joined the company in 1915 at its Winnipeg branch.

Hearings on Minimum Wage

Action has been started toward setting a minimum wage for those employed in all parts of the rubber industry. Officials of the U. S. Department of Labor met with industry and union representatives in Washington in late September to discuss wage data and similar points of interest. A public hearing will eventually be held, and on the basis of testimony offered at that time a minimum wage figure for the industry will be determined. The wage minimums are set under the terms of the Walsh-Healy Act, which gives the government the right to fix pay floors in industries doing a great deal of business with the government, into which classification the rubber industry falls. Whatever the final pay floor is determined for rubber, it is not expected to make any change in the take-home pay of present employees in the industry.

URWA Holds Annual Convention

The 15th Annual Convention of the United Rubber Workers of America (CIO) was held in Cincinnati during the week of September 18. The delegates voted down proposals to increase dues paid by locals to the international union, to increase officers' salaries, to hold the convention every two years rather than annually as at present, to combine the offices of secretary and treasurer in locals, and to make the three top international offices two-year terms instead of one. An important change in the constitution was approved. Hereafter, all agreements with the companies must be taken back to the memberships of the local unions for ratification. Heretofore, in plant-wide bargaining, the policy committee had authority to negotiate to a conclusion and did not require membership ratification to close a deal with the company. In his opening address, L. S. Buckmaster, international president, indicated that the URWA will demand a union shop from the "Big Four."

Since the end of the war Fort Dunlop in England has produced some 50,000,000 bicycle tires. This is believed to be a world record for a five-year production program.

OBITUARIES

Thomas C. Bowdren

Thomas C. Bowdren, associated with the Habirshaw Cable and Wire Corp., Yonkers, N. Y., for the past 35 years, died on September 20 at St. John's Riverside Hospital in Yonkers. Mr. Bowdren, who was in his seventies, had been entrusted with one of the top secrets of World War II in the course of his company duties. During the war period, the company began work on a secret project—that outwardly appeared to be a routine cable. Only high company officials and Mr. Bowdren, who directed the shipment of the "cable," knew it was a special pipeline to be laid across the English Channel to supply gasoline to the invasion forces in France. Mr. Bowdren is survived by his brother.

Robert C. Fenton

Robert C. Fenton, general manager of the C. G. Sargent Textile Machine Manufacturing Co. near Westford, Mass., and one time prominent in the engineering division of the B. F. Goodrich Co., died recently at Westford. He was 64 years old. At one time, Mr. Fenton headed the engineering staff at Goodrich's Plant III. When mobilization was started for World War II, Mr. Fenton offered his services to the Government and supervised the construction and equipment of powder arsenals throughout the country. Since the war he had been associated with the Sargent company. Mr. Fenton is survived by his wife, two sons and two daughters.

THE STORY BEHIND THE WORD...

SILHOUETTE...

Etienne de Silhouette was known as the most miserly Controller General that France ever had. The story in popular Parisian circles at the time was that he was so close-fisted he would only pay for outline drawings to decorate the walls of his home. These black portraits were derisively called silhouettes.

A long record of strength, stability and progressive leadership has made the word Muehlstein—the First name in Scrap Rubber.

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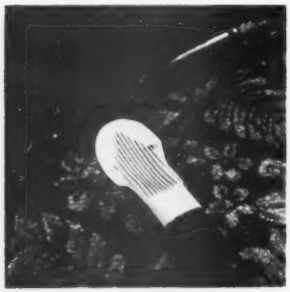
CRUDE RUBBER · SYNTHETIC RUBBER · SCRAP RUBBER · HARD RUBBER DUST · PLASTIC SCRAP

NEW RUBBER GOODS

Flexible Vacuum Cleaner Nozzle

A flexible device which readily fits any vacuum cleaner or any radiator or crevice tool, making it easy to clean hard to get at areas, is currently being marketed by the firm of Seeko, Box 211, Manitowoc, Wisconsin. The unit features flexible lips



which mold themselves to clean any surface and longitudinal ribs for required reinforcement. The nozzle can be used in flat position (see accompanying illustration) to run under furniture, pianos, etc., or by means of a button arrangement can be rolled in to a flexible nozzle for cleaning bed springs, radiator vanes, and the like. The unit is made of soft, non-marring rubber stock.

Rubberized Abrasive Blocks

Cratex rubberized abrasive blocks and sticks as manufactured by the Cratex Manufacturing Co., 81 Natoma St., San Francisco 5, Calif., are made in four grit types ranging from relatively coarse to extremely fine. They can be used in a countless number of ways for cleaning and pol-

ishing metal articles of all types, removing rust, toolmarks, heatmarks, tarnish, stain and corrosion. Cratex rubberized abrasive tools are highly resistant to the deteriorating action of oils, chemicals, heat, oxidation, gasoline, coolants, sunlight and aging. They are also available in a large number of other sizes and shapes, such as wheels, points, discs and cones, as well as in blocks and sticks.

Cherry-Pitting Rubber Cups

U. S. Rubber Co., New York 20, N. Y., has developed a rubber cup which makes it possible to pit cherries with a cleaner, smaller hole and a minimum loss from crushing and tearing. The pitting device consists of a bank of needles and a rotating cylinder containing 700 of these cups. Cherries enter the machine on a conveyor belt and fall automatically into the cups. The needles, operating at a rate of 120 cycles per minute, punch out the pits forcing them through a small hole in the bottom of each cup. The pitless cherry remains in the cup. Rubber cushions the shock which would normally tear the cherry apart. As the cylinder rotates, the cherries pass on to another conveyor belt for sorting and further processing, while the pits are carried away in a stream of water. The cups impart neither taste nor odor to the cherries. Since they are interchangeable, they also make it possible to pit several different sizes of cherries on the same machine.

Pressurized Rubber Suit

The important role played by rubber in military garments is emphasized in the accompanying photograph depicting an Air Force crew member in a new pressure suit which enables airmen to live while flying as high as 62,000 feet. Previously, flying

at this altitude without such a suit would have meant instantaneous death for airmen. The role of rubber in some of the other strange, new types of clothing adopted by military units was shown and described in our September, 1950, issue. The accompanying photograph is an official photo of the U. S. Department of Defense.

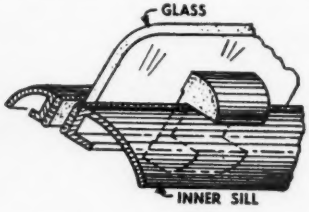
Corrosive Chemicals Bucket

Unbreakable buckets for carrying corrosive chemicals have been developed by the Mechanical Goods Division of the U. S. Rubber Co., New York 20, N. Y. Made of Enrup, a tough new thermosetting blend of plastic and rubber, the buckets are now being produced in quantity at the company's Passaic, N. J., plant. The buckets are said to be lighter and tougher than

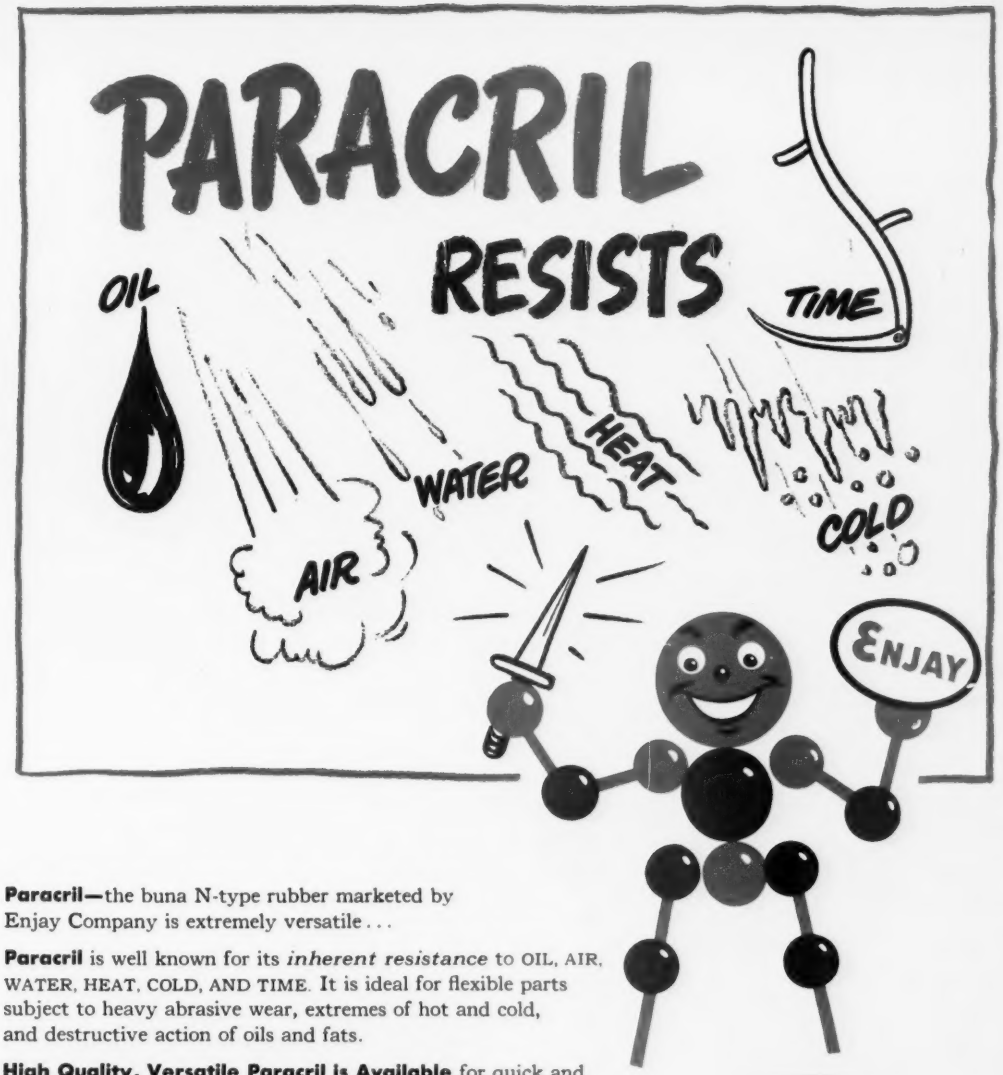
hard rubber varieties. They will resist aliphatic solvents, all concentrations and types of alkalies, most acids and other corrosives up to temperatures of 150° F. They are not designed for carrying formic, glacial acetic or concentrated nitric and sulfuric acids. However, nitric and sulfuric acids in concentrations up to 50% can be handled satisfactorily. The buckets are not recommended for aromatic solvents, esters or ketones. They are produced in the 12-quart size. Each bucket has an Enrup handle which can be replaced if necessary.

Rolexco Anti-Rattle Strip

Rolexco, P. O. Box 11, Orange, N. J., has developed a one piece rubber unit which is easily installed between the inner sill buffer strip and the window glass of an automobile to prevent rattling. The company states that there are no metallic



springs, clips, screws, etc., to mar the car window moulding. Of a neutral, greyish-brown color, the design of the rubber unit makes it cling at the desired position along the window sill. It will fit practically all cars, except convertibles and some station wagons. The accompanying illustration depicts the manner in which the unit is installed.



Paracril—the buna N-type rubber marketed by Enjay Company is extremely versatile . . .

Paracril is well known for its *inherent resistance* to OIL, AIR, WATER, HEAT, COLD, AND TIME. It is ideal for flexible parts subject to heavy abrasive wear, extremes of hot and cold, and destructive action of oils and fats.

High Quality, Versatile Paracril is Available for quick and economical delivery from *5 conveniently located warehouses!*

Write or Call Today: Every Enjay office has competent, trained technicians always available to help you adapt Paracril to solve *your* problem!

Offices at:
Boston 17, Mass., 135 Clarendon St.
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Additives, Alcohols, Esters, Ketones, Rubbers and Plastics

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▲ *The Verigraph Weight Recorder applies the speed and accuracy of electronics to weight recording. Simple to install and operate. This exclusive Foxboro development has been in use by leading companies on critical calendering since 1926.*

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You get a continuous, accurate record of the weight of calendered stock, when your calenders are equipped with the Foxboro Verigraph.*

Regardless of temperature, speed, roughness, or other normal conditions of the material, the Verigraph gives you a precise weight measurement *without contacting* the sheet! The sheet moves between precisely spaced capacitor plates, and the exclusive electronic measuring circuit makes readable records of thickness variations as small as .0001". Such accuracy reduces rejects, improves uniformity, and can save many tons of material annually.

Verigraph Recorders are now in daily use at leading rubber and plastics companies throughout the world. Write for information. **The Foxboro Company, 256 Neponset Ave., Foxboro, Mass., U.S.A.**

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RECORDING
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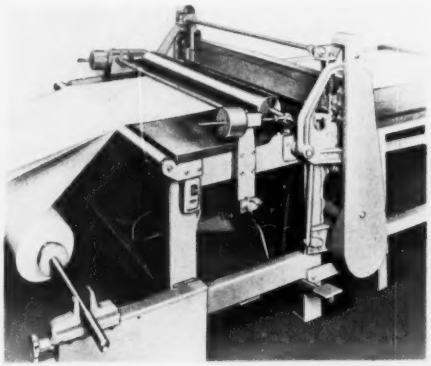
INSTRUMENTS

NEW EQUIPMENT

Jacques Semi-Automatic Power Shear

Said to overcome the high cost of production on materials that up to now have been hard to handle or slow in cutting, the new Jacques Semi-Automatic Power Shear was recently introduced by the Hobbs Manufacturing Co., of Worcester, Mass. Claims made for the new power shear are based on working tests in heavy fabrics, rubber, paper and paperboard plants and show

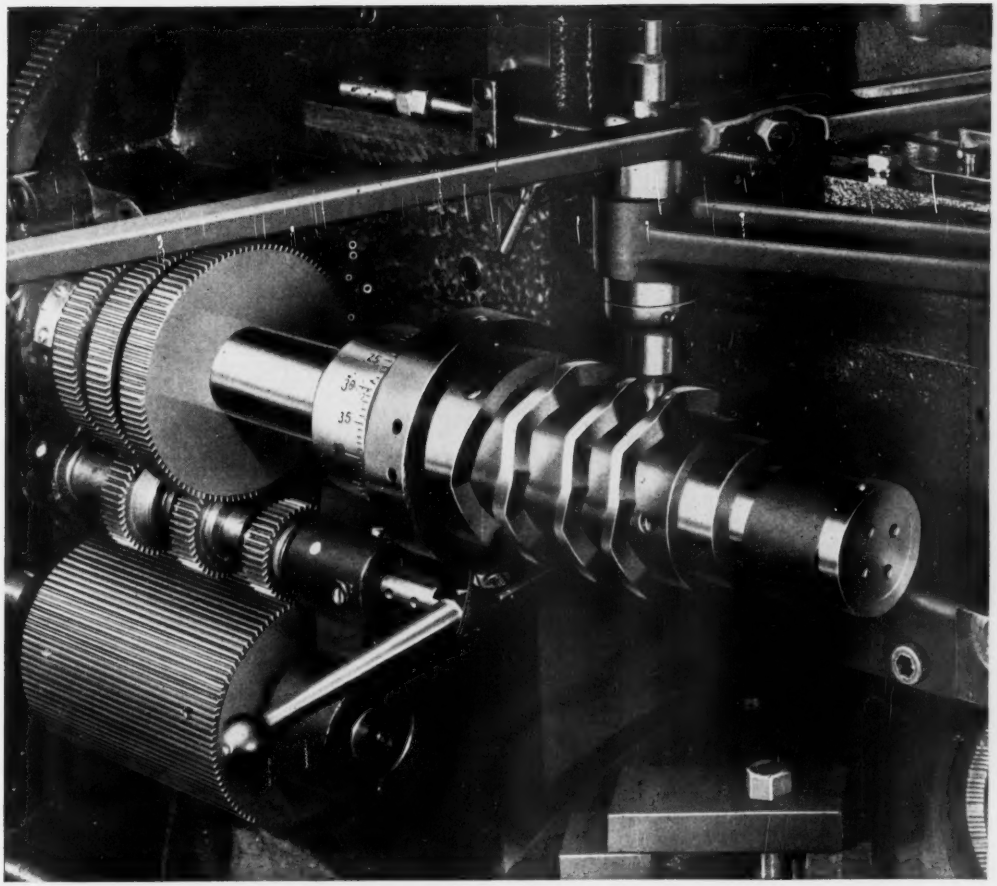


a production capacity of three to ten times hand operation. Up to 70 cuts a minute can be made. The Hobbs shear handles such materials as paper, paperboard, foils, plastics, laminations, rubber, pile fabrics and other similar materials most efficiently.

Additional production over hand operated cutting methods is obtained by versatile feed, receiving and cut-actuating arrangements. Material can be either sheet fed or fed directly from the roll. The cutting head can be mounted directly into a production line or a part of a continuous process or as a finishing trimmer. The upper blade made of composite laminated steel is mounted on the cutting head which is a heavy reinforced casting that moves on hardened steel pillars. The lower blade is mounted on a heavy casting on the forward edge of the welded steel base. Both blade holders allow easy changing of the blades for resharpening by swinging the head mechanism forward.

Many methods of gauging for sheet length are available and any length can be made. The cutter head can be actuated by hand or foot switch, or controlled automatically by feed-roll actuator, photo-electric cell or mechanical ticklers. Feeding into the cutter is accomplished by a rubber-covered steel tube roll which when driven by power makes long cuts quickly. Material passes between the rubber-covered feed roll and a steel roll.

The Hobbs Power Shear is made with a 50-inch cut and the blade is driven by a powerful electric motor through a worm gear drive on main drive shaft. An automatic clamp and safety is mounted to the rear of the upper blade and moves down automatically ahead of the blade to hold material securely during cut. The clamp can also be foot operated.



WHY VARIABLE PITCH MOLDS NO LONGER COST A PREMIUM

UNTIL the development by BRIDGWATER of the transmission shown above, engraved tire molds of the variable pitch type were substantially more expensive than molds of a uniform pitch.

This ingenious unit is a special attachment we use on our BRIDGWATER MOLD ENGRAVING MACHINES*. By shifting the gear lever to any one of three different positions, a long, short or medium pitch may be cut with unfailing accuracy and at a cost essentially no greater than cutting a uniform pitch . . . just another example of our determination to make molds of whatever characteristics the tire industry requires . . . at the lowest possible cost.

* Designed and built by Bridgwater and used by leading mold makers the world over.

ATHENS MACHINE DIVISION

THE BRIDGWATER MACHINE COMPANY

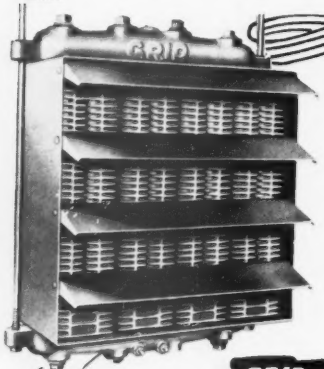
Akron, Ohio

FOR BETTER MOLDS FOR BETTER TIRES *SPECIFY* BRIDGWATER

DO YOU Know

that it's possible

TO GO THROUGH MANY HEATING SEASONS WITHOUT UNIT HEATER MAINTENANCE EXPENSE, providing yours is a GRID installation? It's possible, and being done by major rubber plants who have investigated and installed GRID equipment.



It's possible because:

GRID cast iron construction withstands corrosive fumes.

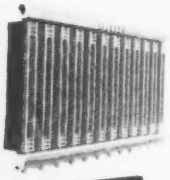
GRID wide fin spacing facilitates easy cleaning.

GRID will withstand steam pressures up to 250 lbs., and is free of electrolysis.

GRID fins are cast integral with the steam chamber assuring even distribution of heat. It's not possible for GRID fins to come loose from the steam chamber to cause loss of heating efficiency.

GRID design incorporating proper fan sizes, motor speeds and outlet temperatures results in a properly balanced heating unit, especially when high steam pressures are used.

BLAST COILS



For outside air, drying, process work, GRID Blast Coils have the same high efficiency as GRID Unit Heaters . . . no tortuous air passages . . . freedom of expansion with complete absence of ruptures, strains, or warping . . . open design for easy cleaning . . . not affected by atmospheric conditions.

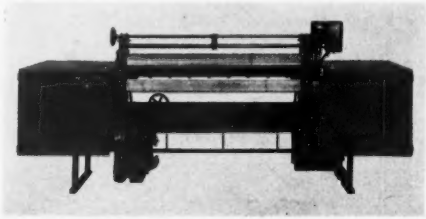
WRITE today for a complete GRID story on maintenance-free heating equipment for your plant.

Investigate **today GRID systems of high pressure unit heaters, blast coils, and radiation . . . the answer to maintenance-free heating in the rubber industry.**

D. J. MURRAY MANUFACTURING CO. WAUSAU WISCONSIN

Mansfield Foam Rubber Splitter

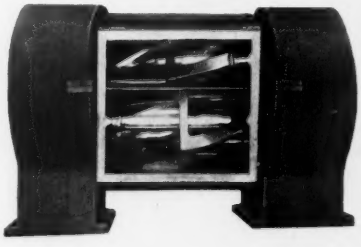
The band knife, grinders and feed roll transmission of the Foam Rubber Splitting Machine produced by the Mansfield Automatic Machine Co., 77 East Dickson Avenue, Mansfield, Ohio, are all driven by individual motors. Feed rolls can be driven at any speed from 45 rpm down to 0 and reverse, and the top speed will give



approximately 50 feet per minute either in continuous lengths or in slab form. All moving parts of the unit are equipped with ball, needle and thrust bearings. The band knife can be used indefinitely without breakage under normal conditions. The machines can be furnished in any width up to 60-inch wide rolls. A special attachment has been designed to lubricate the band knife so that no excessive amounts of lubricants are needed to prevent friction. This eliminates any adverse conditions when fabricating rubber. Rolls can be set to split within .005 variation of the desired thickness.

North Superkneader Mixer

Service for any class up to 3,000 gallons is provided in a new series of double arm type mixing and kneading machines recently introduced by the H. W. North Co., Erie, Penna. Named the Superkneader Series, the units feature a lower charging level combined with an



unlimited choice of unloading positions. Tiltable models offered by the company have working capacities nearly double the rating of lighter duty machines. Heavy duty models include intensive type internal mixers for masticating and dispersing rubber stocks, resin paints, plastics, floor coverings and similar compositions. ASME code welded construction and wide choice of materials make the equipment readily adaptable to any particular process.

SIZE? THICKNESS? COMPRESSIBILITY?

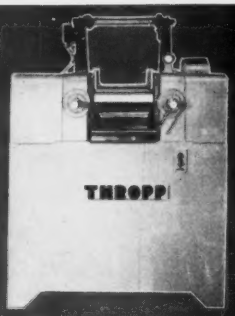
Get the Answers with FEDERAL GAGES

BENCH-TYPE, MODEL 57-B1
Graduated .001", range 1.000", Throat depth 2 5/16".

PORTABLE, MODEL 22P
Graduated .001", range .500", Throat depth 2".

Federal Bench-Type and Portable Gages are designed to meet the specific measuring requirements of your industry. They're built rugged to withstand day-by-day handling. Furnished, if required, with weights and anvil diameters to meet society standards. Many other types available. Write for catalog. Federal Products Corp., ... Eddy St., Providence 1, R. I.

FEDERAL



NEW LABORATORY MILL

6" x 12" with Anti-Friction Bearings

THE laboratory mill illustrated above was expressly designed as a precision mill for operation at high temperature (650° F).

A self contained lubrication system circulates oil through the roll journal bearings. The use of piston ring type oil seals eliminates oil leaks and the frequent replacement of rubber-based oil seals. Write for specification folder.

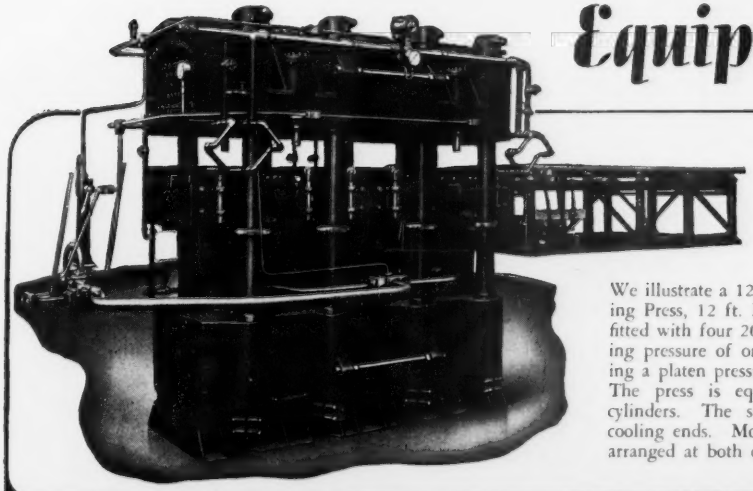
Capacity of mill: 2 to 3 pounds
Space required: 28" wide, 60" long.

- *West Coast Rep.:* H. M. Royal, Inc., 4814 Loma Vista Ave., Los Angeles, Cal.
- *Export Agent:* Steinhardter & Nordlinger, 105 Hudson St., N. Y.

THROPP

WM. R. THROPP & SONS CO. Trenton, N. J.

Hydraulic Vulcanizing Equipment



We illustrate a 1250 ton single daylight Sheeting Press, 12 ft. long by 3 ft. 6 inches wide, fitted with four 20" rams, suitable for a working pressure of one ton per square inch, giving a platen pressure of 450 lbs. per sq. inch. The press is equipped with four opening cylinders. The steel steam chests have 9" cooling ends. Motor driven drawtable can be arranged at both ends of the press if desired.

FRANCIS SHAW & CO. LTD. MANCHESTER 11 ENGLAND

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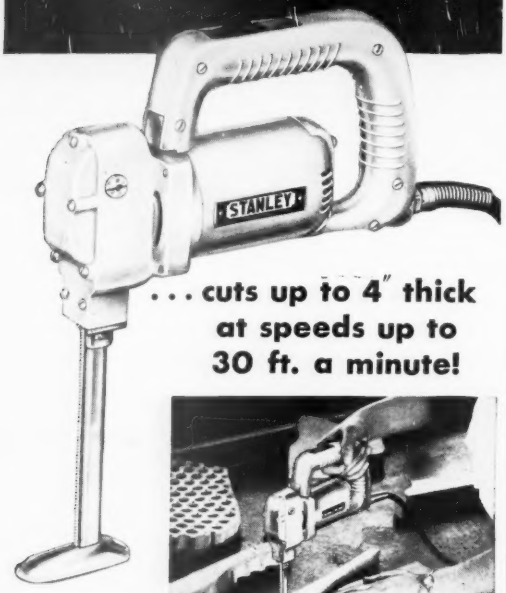
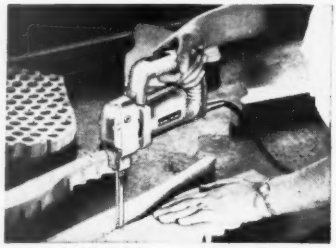
New STANLEY No. 99 SPONGE OR FOAM RUBBER CUTTER



. . . cuts up to 4" thick at speeds up to 30 ft. a minute!



A brand new electric tool designed by Stanley that puts cutting of sponge and foam type rubber on a production basis. Saves time and material.

Follows any line or templet, inside or outside—straight cuts, curves and angles—with hairline precision. No concave edges, no torn or ragged work.

Light weight (only 4 lbs.). The duplex handle permits easy handling on all operations. Girl operators like it.

No. 99 Sponge Rubber Cutter operates on either A.C. or D.C. Blades are made of alloy steel for long life and are easily replaceable.

Save material, save time with the new Stanley Sponge Rubber Cutter No. 99. Ask your supply house, or write for folder. Stanley Electric Tools, 562 Myrtle St., New Britain, Conn.

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Eagle Cycl-Flex Timer

Either a momentary or maintained contact pilot switch can be used to start the new Cycl-Flex Timer produced by the Eagle Signal Corp., Moline, Ill. The instrument is designed with auxiliary contacts operated by the clutch solenoid. These contacts, together with those operated

after the time delay, provide four different load circuit combinations eliminating relays in many applications. The unit mounts in a 3-3/16-inch diameter hole for flush mounting in control panels of electronic heating equipment, molding machines, chemical processing and similar equipment.

The time scale utilizes the full diameter of the timer providing a 9-inch time scale. A toothed clutch operated by a clapper type solenoid insures reliable timing and resetting. The dial and pointers are sealed, making them oilproof. The internal mechanism uses stainless steel shafts with cut brass gears and is completely enclosed in a 3-inch diameter molded housing. The timer is rated at 10 amperes 110 volt and is available for 60, 50 and 25 cycle frequencies of 110 and 200 volts. Time scales are available from 0 to 30 seconds to 0 to 10 hours.

. . . remove the nerve . . .

SEE PAGE 1

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Meticulous workmanship has been a tradition at Brockton Cutting Die for three generations. That's why rubber manufacturers turn to us for quality dies of all kinds . . . for dies that really retain their cutting edge. Our experience and facilities enable us to turn out a cutting die for every type of service.

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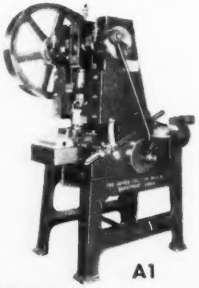

A1

Men who Know PRODUCTION MACHINES Choose

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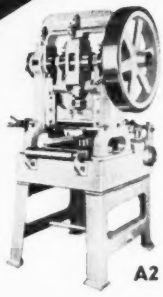
BRIDGEPORT, CONN.

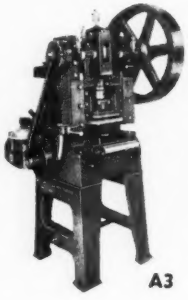
MODEL A-1
Cutting Heels at high speed production or short runs.



A2

MODEL A-2
Cutting Multiple Heels, Half and Full Soles with stock grain.

MODEL A-3
Cutting Multiple Heels and Taps with or across stock grain.



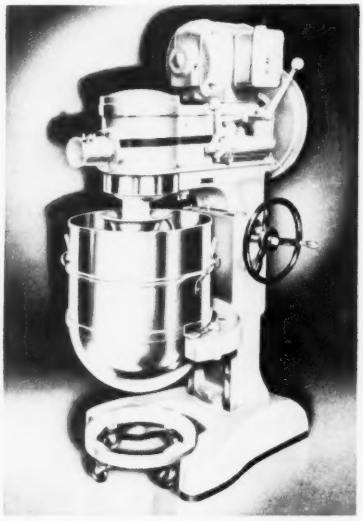
A3

MODEL A-2s
(Not illustrated)
Cutting across grain of stock.

COULTER PRODUCTION MACHINES SINCE 1896

Hobart Model M-800 Mixer

Widely used in the frothing of latex for foam sponge, the Model M-800 Mixer produced by the Hobart Manufacturing Co., Troy, Ohio, may be used with a full line of beaters and whips. The unit utilizes a 2 hp motor which is ball bearing, ventilated and drip-proof. The transmission is ball bearing of the 4-speed selective sliding gear type with hardened gears running in oil. The unit has an improved multiple disc type clutch which alternates steel and Raybestos discs and plates, features 170 square inches of clutching surface, and is equipped with three heavy-duty rocker arm and spring cartridge pressure units, operated by a hardened steel shifting cone. The switch is of the thermal overload, push button type, and is mounted on the motor.

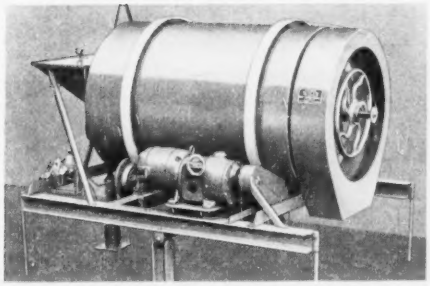


The bowl is of 80-quart capacity and is made of heavily tinned steel, with handles, bands and lugs electrically welded. 30, 40 and 100 quart bowls may also be used with the unit. Bowls are raised or lowered by means of an enclosed rack and pinion lift, self-locking in any position. The spring cushioned lift protects the mechanism from shock. The dolly is self-centering under the bowls. The mixer has a new style center or planetary shaft, spiral bevel gear and pinion, and helical reduction gears, all carried by oversize ball bearings.

Precisely controlled variations of humidity and temperature can be repeated periodically, according to a predetermined program, by means of a new **humidity-temperature test apparatus** announced by the American Instrument Co., Inc., Silver Springs, Md. The apparatus consists of a test chamber, an air-conditioning unit, and a special control system.

An Index to Vol. 67 of RUBBER AGE will be found on Pages 121 to 124 of this issue.

WILLS "SUB-ZERO" ROTARY TUMBLERS



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Holds lowest temperature, with minimum "Dry Ice" consumption, by reason of our method of complete insulation. Has wide loading end hopper. Unloads automatically into tote boxes or conveyor.

Product can be inspected while tumbler is rotating. Equipped with variable speed control motors. Ruggedly constructed, available in two sizes. Suitable for use with other deflashing aids or dry tumbling.

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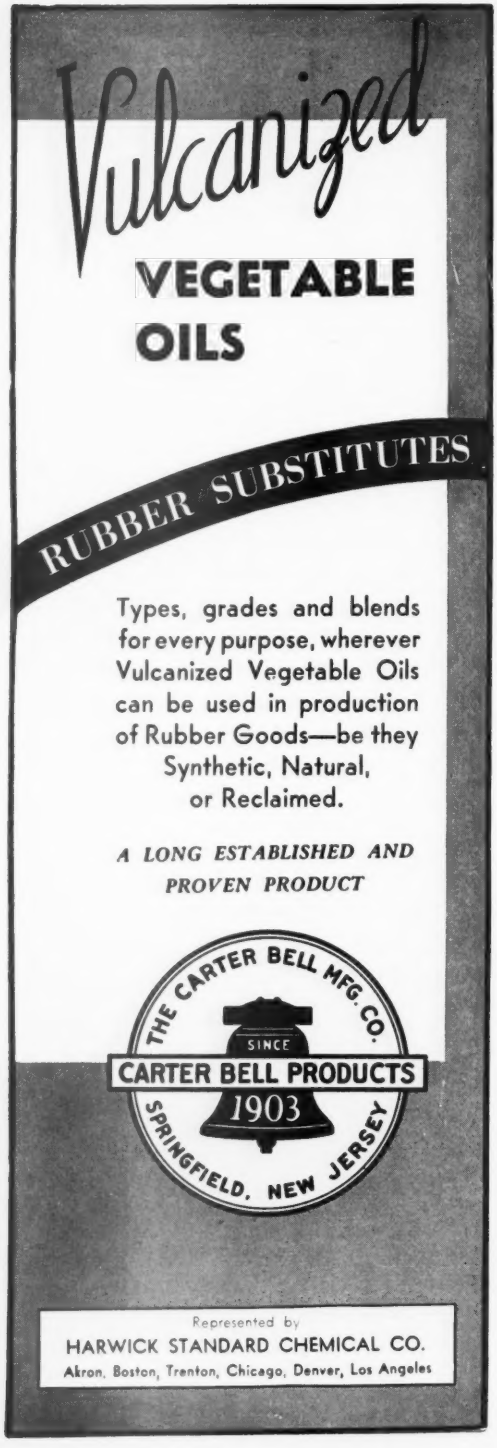
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REVIEWS

BOOKLETS, CATALOGS, etc.

Bakelite Polyethylene. Bakelite Division, Union Carbide and Carbon Corp., 300 Madison Ave., New York 17, N. Y. 8½ x 11 in. 24 pp.

The characteristics, development and latest applications of Bakelite polyethylene resins are summarized in this booklet. Data is included on the material's physical, electrical and chemical characteristics, and the available forms listed. A considerable portion of the booklet is devoted to methods of fabrication, including compounding, extrusion, calendering, molding, casting and coating. The section on extrusion covers wire and cable covering, films, and rods, tapes, tubes and monofilaments. A number of tables are included covering such information as the average properties of polyethylene molding compounds, average physical properties of an electrical compound, compatability of polyethylene resins, acid and alkali resistance of the resins, gas permeability of polyethylene and vinyl resin films, and the swelling of Polyethylene Resin DYNH in liquids.

•

Rubber for the Absorption of Vibration. By J. F. Downie Smith. Published by the Iowa Engineering Experiment Station, Iowa State College, Ames, Iowa. 8½ x 11 in. 50 pp.

This booklet, virtually a manual on the application of rubber for the absorption of vibration, contains five papers prepared by the author and previously published in various scientific journals and one hitherto unpublished paper. Titles of the papers are as follows: (1) Rubber Mountings; (2) Rubber Springs—Shear Loading—I; (3) Rubber Springs—Shear Loading—II; (4) Rubber Springs Under Compression Loading; (5) Research on Rubber for Mechanical Engineers; (6) The Design of Rubber Mountings. The latter paper is the one now published for the first time. Dr. Smith has been associated with the Edward G. Budd Manufacturing Co. and the United Shoe Machinery Co. He is currently dean of the engineering division of Iowa State College.

•

A Survey of Automotive Engineers in Regard to Natural and Synthetic Rubber in Passenger Car Tires. Natural Rubber Bureau, 1631 K St., N.W., Washington 6, D. C. 8½ x 11 in. 32 pp.

The results of a survey designed to secure accurate and objective information on the relative merits of natural and synthetic rubber for passenger car tires are given in this report. It reflects the opinions of 32 automotive engineers, all of whom were asked to agree or disagree with nine specific statements. When asked to take all factors into consideration, 18 (or 56%) expressed their preference for a 100% natural rubber tire; 8 (or 25%) preferred a synthetic rubber tire with a substantial increase in the present natural content, and 4 (or 12½%) chose a synthetic tire built to present government specifications, while 2 (or 6½%) expressed no preference. The statements made, a tabulation of the replies, and various comments are given in the report.

•

Exhibiting and Controlling Instruments for Use with Flowrator Meters. (Catalog 50.) Fischer & Porter Co., Hatboro, Penna. 8½ x 11 in. 28 pp.

The basic devices for coupling a primary metering element to a secondary or exhibiting instrument are discussed in this catalog. The "Magnaband" magnetic clutch and the electric impedance bridge transmitting systems are also discussed. The exhibiting instruments illustrated and described include flow indicators, recorders, integrators and a new pneumatic controller unit.

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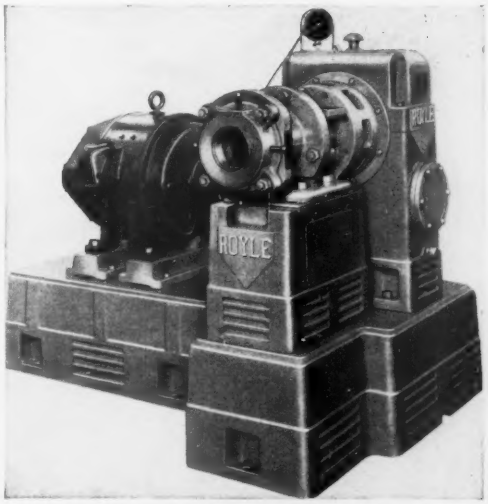
Send for your copy of Bulletin No. 448. It describes these features and how they may be applied to older type extruders.



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REVIEWS (CONT'D)

Applications of Velsicol Resins in Rubber Compounding. (Bulletin No. 218). Velsicol Corporation, 330 East Grand Ave., Chicago 11, Ill. 9 x 11½ in. 8 pp.

The application of two Velsicol resins—GE-9 and AB-11-4—in rubber compounds are discussed in this technical bulletin. The physical and electrical properties of the resins, which are essentially thermoplastic hydrocarbon materials, are outlined, and application at various loadings in typical formulations shown, with physicals being indicated in each case. Particular attention is given to tread type formulations, although suggested applications include battery cases, floor tiling, hard rubber compounds, soles and heels, gaskets and jar rings, etc. According to the report, the two Velsicol resins mill readily, allowing easy incorporation of fillers and pigments to produce smooth milling stocks. They are also said to be efficient plasticizers for rubber in the presence of carbon black.

•

C. P. Hall Co. Catalog. The C. P. Hall Co., 2510 First-Central Tower, Akron 8, Ohio. 8½ x 11 in. 76 pp.

The salient characteristics of the numerous products manufactured and distributed by the company for the rubber, plastics and allied industries are briefly covered in this new, comprehensive catalog. It is divided into five sections, as follows: (1) Accelerators, Antioxidants, Activators, etc.; (2) Acids; (3) Pigments, Solvents, Miscellaneous; (4) Plasticizers, Reclaiming Oils, Solvents; (5) Specialties. Chemical and physical properties, analyses, specifications and type of packaging, as well as recommended uses, are shown for each of the products listed. Among the specialties included are additives, carriers, defoamers, emulsifiers, fatty acid esters and lubricants, most of them going into fields other than rubber.

•

Dow Corning Silicone Mold Release Agents. Dow Corning Corporation, Midland, Mich. 8½ x 11 in. 8 pp.

Descriptions, applications and advantages of the various silicone mold release agents featured by the company are summarized in this brochure. Among the materials discussed are DC Mold Release Emulsion Nos. 35, 35-A and 35-B, DC Mold Release Fluid, and Dow Corning 7 Compound. Use of these materials in the rubber field as mold lubricants for application on molds used for curing tires, air bags, soles and heels, floor tile, and mechanicals in general, is discussed. A section of the brochure is also devoted to the company's release agents for plastics. In most instances, proper concentrations are suggested. The brochure is profusely illustrated.

•

Cleveland Worm Gear Speed Reducers. (Bulletin No. 130). Cleveland Worm and Gear Co., 3249 East 18th St., Cleveland 4, Ohio. 8½ x 11 in. 36 pp.

This bulletin illustrates and describes the new type AT and RT worm gear speed reducers now being manufactured by the company. The units are the same as those previously featured by the company, but with several engineering improvements. For example, face type oil seals are used in place of the older style packing gland on type AT units. The new horsepower ratings tables in the current bulletin are easier to work with for they show output speeds and the more frequently used 1750 r.p.m. ratings are also indicated.

•

Electrical Heating Units for All Industrial Requirements. Tuttle and Kift, Inc., 1823 Monitor Avenue, Chicago 39, Ill. 9¾ x 12 in. 16 pp.

Made up in loose-leaf, specification sheet form, this booklet lists voltages, wattages, temperature ranges, dimensions, shipping weights and prices, as well as applications and uses for the immersion, urn-type, finrod, rod-type and other electric heating units offered by the company. Each of the units is illustrated and completely described. Data on connections and switches is also included.

NA-22: An Accelerator for Neoprene. (Report No. 50-1). By R. R. Radcliff, L. R. Mayo and F. H. Fritz. Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Wilmington 98, Del. 6¼ x 9½ in. 16 pp.

The satisfactory effects of NA-22 (2-mercapto imidazoline), the new general purpose accelerator for use with the neoprenes, is covered in this technical report. Among results discussed are those with Neoprene Types W, GN, GN-A, RT and FR. Numerous typical formulations were tested, with physicals reported in each instance. The conclusions drawn in the report are that the use of NA-22 results in compounds having high resilience and low compression set, that it does not contribute to darkening on cure, to discoloration on light exposure, or to the staining of common organic finishes, and that neoprene vulcanizates containing NA-22 and a conventional antioxidant have exceptionally good aging properties.

•

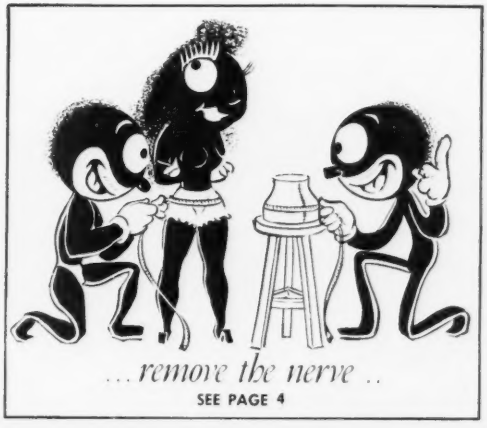
St. Joe Zinc Oxides. St. Joseph Lead Co., 250 Park Ave., New York 17, N. Y. 8 x 10¾ in. 60 pp.

This is a comprehensive and informative manual on lead-free zinc oxide. It is divided into two sections, the first concerning itself with a history of the company and the production of the company's lead-free zinc oxides, and the second containing representative technical data on the various grades of black, red and green label zinc oxides. The latter section is accompanied by photomicrographs and charts analyzing the particle size distribution characteristics of the various zinc oxides and includes a brief discussion of the role of these materials in the major consuming industries. The application of zinc oxide in rubber compounds is covered in a four-page section, with other sections devoted to applications in protective coatings, paints, ceramics, and chemical, pharmaceutical and other products.

•

Compression Set of Neoprene Type W: Effect of Sulfur. (Report BL-237). Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Wilmington, Del. 6¼ x 9½ in. 4 pp.

A study of factors affecting the compression set of Type W stocks has shown that the presence of sulfur in such stocks has a pronounced, adverse effect, particularly at temperatures above 150° F. This report presents data illustrating this effect and recommends a curing system for compounds requiring minimum set. It is concluded that Neoprene Type W compositions designed for low set should be accelerated with NA-22 or Permalux and should not contain sulfur or materials containing available sulfur.



SEE PAGE 4

New Stock Cooling Rack

This new Rack gives unobstructed access to three sides of each tray and offers a convenient method for storing materials that require cooling or air drying. Trays are spring supported and can be quickly raised or lowered, free from all locking devices. Racks having 18 perforated trays 36" x 36" or plain surface trays 36" deep by 4 ft., 6 ft. and 8 ft. long, can be furnished either stationary or mounted on casters.

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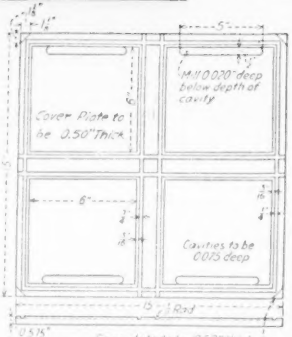

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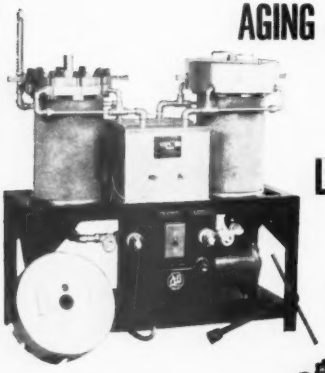

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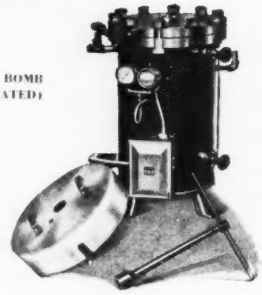

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REVIEWS (CONT'D)

Antioxidant 2246. (Bulletin No. 815). Calco Chemical Division, American Cyanamid Co., Bound Brook, N. J. 8½ x 11 in. 24 pp.

The chemical and physical properties and the compounding characteristics of Antioxidant 2246, the new non-toxic, non-staining and non-discoloring antioxidant for natural and synthetic rubbers, recently introduced by the company, are outlined and discussed in this technical bulletin. Since most synthetic rubbers already contain some antioxidant only typical results obtained with Antioxidant 2246 in natural rubber are shown in the report. Among specific formulas included are white footwear type stocks, white bathing cap type stocks, and latex compounds. Physicals are shown before and after aging, including data on light and sunlamp exposure tests. Loadings of 0.25 to 2.0% of Antioxidant 2246 were used in the compounds tested.

•

Witco Blacks in Natural and Chemical Rubbers. Carbon Black Division, Witco Chemical Co., 295 Madison Ave., New York 17, N. Y. 8½ x 11 in. 64 pp.

Results of an extensive investigation of several Witco blacks in an unusually wide loading range in typical natural and chemical rubber stocks, including GR-S, butyl rubber, neoprene and Hycar OR-25, are furnished in this technical treatise. In graphs appearing at the beginning of the section on each elastomer, data at approximately optimum cure are plotted except for unaged tensile and tear for which the maximum and average values, respectively, are given. The graphs simplify comparisons of the different blacks as well as show how the behavior of each black depends on loading. Results at various cure times appear in tables following the graphs. The mixing and testing procedures used are outlined in the final section of the report.

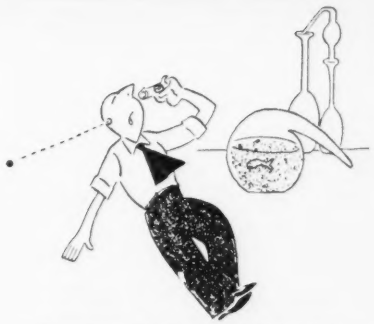
•

Industrial Temperature Measurement and Control. (Bulletin No. 101). Partlow Corporation, New Hartford, N. Y. 8½ x 11 in. 24 pp.

The basic principles of industrial temperature control are set down in extremely usable fashion in this bulletin. Intended as a guide for design and process engineers, it defines the different types of control systems and distinguishes between them so that the engineer can logically select the particular type most appropriate to his own situation. The eight ways of responding to temperature, the five ways of putting that response to work, and the nine basic instrument types made by the company are described. Thereafter, the work is devoted to relative evaluations of systems and the numerous important considerations of application engineering.

... remove the nerve...

SEE PAGE 4



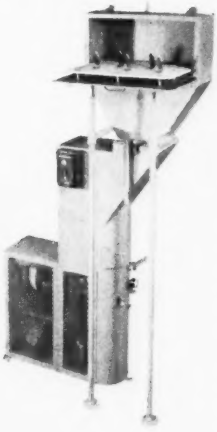
DON'T BE DISCOURAGED

After you have carefully worked out the formula for the "mix" and painstakingly indicated every roll temperature, don't be discouraged if lumps show up in the calender rolls. It's an even bet the operators are guessing roll temperature. Provide them with CAMBRIDGE Roll Pyrometers. Their accurate rugged easy-to-use instruments will definitely help to control temperature, thus cut waste and make better rubber products. *Send for Bulletin 194SA.*

Cambridge Instrument Co., Inc.
3754 Grand Central Terminal,
New York 17, N. Y.

CAMBRIDGE
ROLL • NEEDLE • MOLD
PYROMETERS

PIONEER MANUFACTURERS OF PRECISION INSTRUMENTS



Cleans Up Dirty Operations!

The Campbell Bagloader attached to this Campbell Soapstoner makes dusting of extruded goods a neat-as-a-pin job, keeps air and workers clean, means more production.

Just place a bag of Soapstoner in the top of the Loader. Pierce the bag. Close the lid. There you are. No dust gets out and you've loaded the Soapstoner till the bagful is used.

Compare this *clean* operation to others. Then ask for a quotation on the Bagloader. Write, wire or phone us today.

The FALLS ENGINEERING AND MACHINE CO.
1734 FRONT ST. CUYAHOGA FALLS, OHIO
Established 1917

A PROCESSING AID FOR THE MANUFACTURE OF FLOOR TILE

Use 12 volumes of SOLKA-FLOC to replace an equal volume of mineral filler to obtain:

EASIER PROCESSING STOCKS
- better plasticity
- lower batch temperature
- less power consumption

BETTER FINISHED TILING
- resilience with hardness
- high dimensional stability
- smoother surfaces

For further information and samples, write to our Technical Service Department.

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SOLKA & CELLATE PULPS • SOLKA-FLOC • NIBROC PAPERS • NIBROC TOWELS • NIBROC KOWTOWLS • BERMICO SEWER PIPE, CONDUIT & CORES • ONCO INSOLES • CHEMICALS

MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, OCT. 5, 1950

Natural Rubber

The high price of natural rubber was maintained during the past period. Since our last report (September 6), the price of spot rubber reached a high of 61.50 cents on September 25, and a low of 51.00 on September 28 and again on September 29, representing a differential of 10.50 cents. The average price of spot rubber for September was 55.98 based on 20 trading days. This compares with an average of 51.63 cents in August.

New minimum original margins for rubber futures were instituted on October 2 by the Board of Governors of the Commodity Exchange. The new requirements will work on a sliding scale which provides for an automatic adjustment of margins to fluctuation in the price of the contract. Thus, the margin of a regular transaction when the contract sells at 65 cents a pound will be $5,500, but when the contract price is 35 cents the margin will be only $1,500.

The Malayan Government is considering raising the export duty on rubber "substantially" to help pay for its anti-terrorist campaign, according to the *Singapore Free Press*. The present export duty on rubber is 5%. The rubber industry also pays additional fees to finance research and publicity.

The Soviet Union bought 22,990 tons of rubber from Malaya during July and August. The figure for the same period last year was 18,688 tons. In the first eight months of 1950, the Russians bought 58,787 tons of rubber from Malaya.

Today's quotations on the outside market, London and Singapore follow:

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.58
October	.57
November	.54½
Thin Latex Crepe:	
Spot	.61
November	.57½
Thin Brown Crepe, No. 2	.52½
Ambers, No. 3	.52½
Flat Bark Crepe	.47

London Market

(Standard Smoked Sheets)

November	52.50 - 53.08
December	51.33 - 51.92

Singapore Market

(Standard Smoked Sheets)

November	48.78 - 49.11

Synthetic Rubber

(Dry Types-Per Pound)

Butaprene NF	.440 - .450
Butaprene NL	.450 - .460
Butaprene NAA	.490 - .500
Butaprene NXM	.520 - .530
Chemigum 30 N4NS	.400 - .470
Chemigum 50N4NS	.400 - .470
Chemigum N3	.450 - .520
GR-I	—— - .185
GR-S	—— - .185
Hycar OR 25	.450 - .460
Hycar OR 15	.520 - .530
Hycar OS-10	.500 - .510
Neoprene Types CG and AC	—— - .500
Neoprene Type E	—— - .650
Neoprene Types FR and KNR	—— - .750
Neoprene Type GN	—— - .350
Neoprene Type GN-A	—— - .350
Neoprene Type RT	—— - .370
Neoprene Type S	—— - .350
Neoprene Type W	—— - .370
Paracril 18	.430 - .450
Paracril 26	.440 - .460
Paracril 35	.510 - .530
Silastic (compounded)	2.35 - 4.40
Thiokol Type A	.370 - .470
Thiokol Type FA	.520 - .620
Thiokol PR-1	.750 - .850
Thiokol Type ST	.750 - .850

Scrap Rubber

Demand for scrap rubber continues at the high levels maintained during the past few months. Reclaimers are taking substantial tonnages of scrap. The Traffic Committee of the National Association of Waste Material Dealers has proposed that the recently reduced freight rates for scrap in certain territories be applied to other regions. Prices remain at substantially the same levels. Current quotations follow:

Mixed passenger tires	ton	$21.00
Beadless truck tires	ton	nom.
Mixed truck tires	ton	nom.
Beadless passenger tires	ton	nom.
No. 1 passenger peelings	ton	60.00
No. 1 truck peelings	ton	60.00
Red passenger tubes	lb.	.12
Black passenger tubes	lb.	.09
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	nom.
Red truck tubes	lb.	.12
Black truck tubes	lb.	.09
Buffings	ton	25.00

Reclaimed Rubber

Consumption of reclaim for the month of August was estimated at 25,807 long tons by the Department of Commerce. This compares with the 22,377 long tons consumed in the previous month. The market for reclaimed rubber continues at an extremely high level. Demand has begun to exceed the available supply with all plants running at capacity. Prices for reclaimed rubber have been raised to conform with present market conditions. Current quotations follow:

Tires

Black, Digester (Natural)	lb.	.10¾ - .11
Peels No. 1	lb.	.11 - .11½
Whole Tire (Blend)	lb.	.10 - .10½

Inner Tubes

Black (Natural)	lb.	.19 - .20½
Red (Natural)	lb.	.24 - .24½
Butyl	lb.	.11 - .11½

Cotton Tire Fabrics

While the market for cotton tire fabrics continues strong, it has been estimated that the present annual production of synthetic tire yarn has displaced some 700,000 bales of cotton. However, current conditions are such, that the market for cotton tire fabrics is enjoying the highest levels which have been seen for some time. In accordance with these strengthened conditions, prices for cotton tire fabrics have been revised upward. Current quotations follow:

Standard, Peeler, 12/4/2	lb.	.88
Standard, Peeler, 14/4/2	lb.	.90
Standard, Peeler, 16/4/3	lb.	.92½
Extra Staple, Peeler, 12/4/2	lb.	.94
Extra Staple, Peeler, 14/4/2	lb.	.96
Extra Staple, Peeler, 16/4/3	lb.	.99

Chafers

14.4 oz. (per sq. yard)	lb.	.83½
9.25 oz. (per sq. yard)	lb.	.80
11.65 oz. (per sq. yard)	lb.	.77
8.9 oz. (per sq. yard)	lb.	.81½

Cotton

The market for middling uplands on the Cotton Exchange moved in the narrow range of 95 points since our last report (September 6), high for the period being 42.15 cents reached on September 30, and low being 41.20 cents reached on September 23. The average price of middling uplands for the month of September was 41.62 cents based on 23 trading days. This compares with an average of 38.93 cents in August.

Dwindling cotton supplies and a short crop this year has led the Government to lift restrictions on cotton production next year and to call for a larger crop. Secretary of Agriculture Charles T. Brannan announced that farmers will be free to grow all the cotton they want. Rigid acreage allotments and marketing quotas in effect this year will be withdrawn for the 1951 crop.

The International Cotton Advisory Committee has reported that world cotton supplies are now tighter than at any time since the 1930's. The group said the 1950-51 world cotton stockpile totals 27,000,000 bales compared with 31,000,000 available for the 1949-50 season. A drop in the U. S. 1950 crop of nearly 6,000,000 bales below 1949 may be partially offset by an increase of 2,000,000 bales in other countries.

Rearmament programs will keep the yearly world consumption level at about 29,500,000 bales for the new cotton season. This will reduce world carryover stocks at least 2,500,000 bales to less than 14,000,000 bales, the lowest level of cotton stocks since 1937. World cotton stocks on July 31, 1950, were estimated at 16,400,000 bales by the Department of Agriculture.

Quotations for middling uplands on the Exchange follow:

	Sept. 6	October 5		
	Close	High	Low	Close
Oct.	40.28	41.13	40.85	41.23
Dec.	40.28	40.90	40.39	40.90
Mar.	40.46	40.64	40.05	40.64

Closing Rubber Prices on New York Commodity Exchange

(No. 1 R.S.S. Contract)

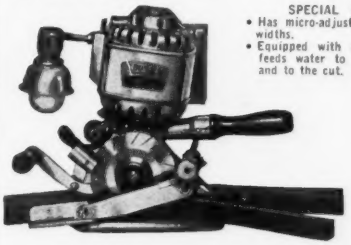
FROM SEPTEMBER 7 TO OCTOBER 5

Sept.	Spot	Dec.	Mar.	May	July	Sales
7	53.50	49.00	46.60	44.60	43.80	26
8	54.50	48.60	46.60	44.60	43.80	72
9	——	——	——	——	——	——
10	——	——	——	——	——	——
11	54.00	50.60	48.60	46.60	45.80	135
12	56.00	49.50	47.70	45.40	44.60	116
13	55.50	51.50	49.40	47.40	46.60	77
14	57.50	52.20	50.00	48.00	47.20	46
15	58.00	52.75	51.00	49.00	48.20	148
16	——	——	——	——	——	——
17	——	——	——	——	——	——
18	59.00	51.35	49.00	47.00	46.20	80
19	57.00	52.25	49.00	46.50	45.70	198
20	59.00	53.15	49.65	47.50	46.70	21
21	60.50	53.00	48.65	46.40	45.10	57
22	60.50	53.75	49.50	46.50	45.00	36
23	——	——	——	——	——	——
24	——	——	——	——	——	——
25	61.50	51.75	47.50	44.50	43.00	60
26	57.00	49.75	45.50	42.50	41.00	70
27	57.00	47.75	43.50	40.50	39.00	92
28	51.00	45.75	41.50	38.50	37.00	28
29	51.00	47.75	42.55	39.50	39.00	80
30	——	——	——	——	——	——
Oct.						
1	——	——	——	——	——	——
2	52.50	49.75	44.55	41.50	40.00	108
3	57.00	51.75	46.55	43.50	42.00	64
4	58.50	53.75	48.55	45.50	43.75	97
5	59.50	52.50	47.00	43.50	42.00	67

SIMPLEX
REG. TRADE MARK

RUBBER STRIP CUTTER
PATENTED

A PORTABLE machine capable of stripping slab rubber up to 1″ thick at the rate of 20,000 feet in 8 hours. Any width desired.



SPECIAL FEATURES
- Has micro-adjustment for accurate widths.
- Equipped with water tank which feeds water to the slotted knife and to the cut.
- Has repulsion induction motor which carries any overloads.
- Automatic sharpener device keeps knife keen and sharp.
- Has base with rollers and is very easy to handle.

Cuts within 1/64 inch to 1/100 inch tolerance depending on grades of rubber. Cuts a slab down to the last shaving. Cuts all grades of rubber including pure gum, sponge, etc. Cuts squarely—no rejects.

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72-75% Latex Concentrate

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RUBBER CORPORATION OF AMERICA

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111 West Monroe Street, Chicago 3, Ill.

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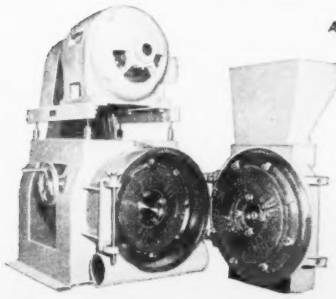
FOREMOST waste cutters feature an *exclusive* twin-knife cutting arrangement that cuts waste CLEANLY—without tearing—cuts all thicknesses from shower curtains to automobile tires.

FOREMOST makes a complete line of waste cutting and grinding equipment. Our engineering department welcomes your inquiries on anything from a single machine to a complete waste material grinding system.

Equally efficient and practically dust-free cutting of ... Foam Rubber • Sponge Rubber • Rubber Thread • Rubber • Plastics • Cork • Paper • Leather

A waste cutter for every type of service

1 hp cutter, belt drive, air-cooled, automatic feed. Cuts to 1/8" mesh. Capacity up to 150 lbs. per hour. (Not shown)



(Right) 10 or 25 hp cutter, belt drive, air-cooled, automatic feed. Cuts to 1/8" mesh. Capacity: 10 hp, 400 to 1400 lbs. per hour; 25 hp, 1400 to 2500 lbs. per hour.

(Left) 50 hp grinder, belt drive, water-cooled, automatic feed. Access to grinding chamber by means of one hinged pin. Grinds to any desired mesh. Capacity 350 to 750 lbs. per hour.

Waste Cutting and Grinding Equipment

FOREMOST MACHINE BUILDERS, INC.

82-31 51st Avenue Elmhurst, L. I., N. Y.

CURRENT MARKET PRICES

Of Rubber Chemicals and Compounding Ingredients

OCTOBER 4, 1950

Prices are, in general, f.o.b. works. Range of prices indicates grade or quantity variations.

Abbreviations: bbls., barrels; c.l., carlot; cyl., cylinder; dlvd., delivered; dms., drums; l.c.l., less than carlot; M.B., masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

[a] East of Mississippi.

*For Export Only

—The arrangement of this section follows closely the Chemical Section of the 1949 RUBBER RED BOOK to which readers are referred to determine the classification of any material or brand name. —Although suppliers of every material were contacted for price information, only those materials are listed for which quotations have been furnished us. The quotations are not guaranteed and prospective purchasers should contact suppliers for confirmation before placing orders. Suppliers are requested to send us regularly current prices on all of their materials used in the rubber industry.

ACCELERATORS

A-1 (Thiocarbanilide)	lb.	.44	- .51
A-32	lb.	.59	- .69
A-77	lb.	.42	- .55
A-100	lb.	.42	- .55
Accelerator No. 8	lb.	——	- .98
Accelerator—49	lb.	.48	- .49
Accelerator—89	lb.	——	- **1.20**
Accelerator—122	lb.	——	- **1.30**
Accelerator—552	lb.	——	- **1.80**
Accelerator—808	lb.	.59	- **.61**
Accelerator—833	lb.	**1.13**	- **1.15**
Acro AC-165	lb.	**.37**	- **.39**
Altax	lb.	.37	- .40
Ancap*	lb.	.27	- .29
Ancatax*	lb.	.35	- .37
Ancazide* ET	lb.	——	- 1.00
ME	lb.	——	- 1.10
Ancazate* BU (ET & ME)	lb.	——	- 1.00
Arazate	lb.	——	- **2.16**
Beutene	lb.	**.59**	- **.61**
Bismate, Rodform	lb.	——	- 3.00
Butasan	lb.	——	- **1.00**
Butazate	lb.	——	- **1.00**
Butyl Eight	lb.	**1.00**	- **1.25**
Captax	lb.	.29	- .32
C-P-B	lb.	——	- **1.95**
Cumate, Rodform	lb.	——	- 1.45
Dibenzo G-M-F	lb.	——	- 2.50
Diorthotolylguanidine	lb.	.51	- .53
Diphenylguanidine	lb.	.43	- .44
El-Sixty	lb.	.45	- .52
Ethasan	lb.	——	- **1.00**
Ethazate	lb.	——	- **1.00**
Ethex	lb.	——	- 1.00
Ethyl Thiurad	lb.	——	- **1.00**
Ethyl Tuex	lb.	——	- **1.00**
Ethylac	lb.	.88	- .90
G-M-F	lb.	——	- 2.50
Good-rite Erie	lb.	.31½	- .33½
Guantal	lb.	**.47**	- **.54**
Harvex	lb.	.52	- .57
Hepteen	lb.	**.42**	- **.44**
Base	lb.	**1.80**	- **1.85**
Ledate, Rodform	lb.	——	- 1.00
Mercaptobenzothiazole	lb.	.34	- .36
Mercaptobenzothiazyl Disulfide	lb.	.42	- .44
Mertax	lb.	.44	- .51
Methasan	lb.	——	- **1.00**
Methazate	lb.	——	- **1.00**
Monex	lb.	——	- **1.10**
Mono Thiurad	lb.	——	- **1.10**
Morfex	lb.	.59	- .61
2-MT	lb.	——	- .75
NA-22 (for neoprene)	lb.	——	- 1.50
Novac	lb.	——	- **1.40**
A-13	lb.	**.65**	- **.67**
O-N-A-F	lb.	.43	- .45
Pentex	lb.	——	- 1.00
Flour	lb.	——	- .20
Permalux (for neoprene)	lb.	——	- 1.85
Phenex	lb.	.40	- .45
Pipazate	lb.	——	- **1.53**
Pip-Pip	lb.	——	- **1.80**
R-2 Crystals	lb.	——	- **1.75**
Rotax	lb.	.42	- .44
RZ-50	lb.	——	- 1.00
SA-52	lb.	——	- **1.10**
SA-57	lb.	——	- **1.00**
SA-62	lb.	——	- **1.00**
SA-66	lb.	——	- **1.45**
SA-67	lb.	——	- **1.00**
SA-77	lb.	——	- **1.00**
Safex	lb.	——	- **1.15**
Santocure	lb.	.61	- .68
Selazate	lb.	——	- **1.45**
Selenac (Ethyl, Methyl)	lb.	——	- **1.45**
Setsit-5	lb.	**.75**	- **1.00**
SPDX-GH (tons)	lb.	**.64**	- **.65**
GL	lb.	——	- .95
Tellurac	lb.	——	- **1.45**
Tepidone	lb.	——	- **.55**
Tetrone A	lb.	——	- **1.25**
A	lb.	——	- **1.85**
Thiocide	lb.	.42	- .49
Thionex	lb.	——	- **1.10**
Thiotax	lb.	.34	- .41
Thiurad	lb.	——	- **1.10**
Thiuram E	lb.	——	- **1.00**
M	lb.	——	- **1.10**
Trimene	lb.	**.54**	- **.56**
Base	lb.	**1.03**	- **1.06**
Tuads, Ethyl	lb.	——	- **1.00**
Tuads, Methyl	lb.	——	- **1.10**
Tuex	lb.	——	- **1.10**
Ultex	lb.	1.00	- 1.05
Unads	lb.	——	- **1.10**
Ureka Base	lb.	.63	- .70
Ureka C	lb.	.68	- .75
Vitasan Crystals	lb.	**.48**	- **.53**
Vulcanex	lb.	——	- **.55**
Z-B-X	lb.	——	- **2.45**
Zenite	lb.	.42	- .44
A	lb.	.50	- .52
B	lb.	.50	- .52
Zenite Special	lb.	.43	- .45
Zetax (uncoated)	lb.	.38	- .41
Zimate, Butyl	lb.	——	- **1.00**
Zimate, Ethyl	lb.	——	- **1.00**
Zimate, Methyl	lb.	——	- 1.00

ACTIVATORS

Blue Lead, Sublimed (dlvd.)	lb.	.13¼	- .14¼
Fish Oil, Hydrogenated, Fatty Acid			
Hydrofol Acid (dlvd.)	lb.	.17½	- .19½
Hyfac 430 (dlvd.)	lb.	.19½	- .20¼
Neo-Fat H.F.O. (dlvd.)	lb.	.14½	- .15¾
Stearex Beads (dlvd.)	lb.	.12	- .13¾
Lime, Hydrated			
Arrowhead	ton	——	- 20.65
Marblehead	ton	——	- 14.30
Sierra	ton	——	- 19.50
Litharge			
Eagle (dlvd.)	lb.	——	- .1875
FSB (dlvd.)	lb.	——	- .1875
Magnesium Oxide, Heavy			
General Magnesite 500	lb.	.05	- .06½
600	lb.	.06	- .08
Michigan No. 15	lb.	.0550	- .0600
Permanente	lb.	.05	- .06½
Magnesium Oxide, Light			
Baker's (Neoprene Grade)	lb.	——	- .31
General Magnesite (Neoprene Grade)	lb.	——	- .30
General Magnesite No. 101	lb.	——	- .19
General Magnesite Standard	lb.	——	- .22
K & M (Neoprene Grade)	lb.	——	- .31
Maglite "M" (l.c.l.)	lb.	——	- **.31**
Marine's (Neoprene Grade (l.c.l.)	lb.	——	- **.31**
Michigan No. 30	lb.	——	- **.24**
No. 40 Extra Light	lb.	——	- **.31**
Witco Extra Light	lb.	.32	- .35

ACTIVATORS (Cont'd)

Oleic Acid			
Emersol 210 (dlvd.)	lb.	.19	- .21½
L.C.P. Red Oil	lb.	.19	- .21¼
Red Oil (20-24 Saponified) (dlvd.)	lb.	.12¾	- .14½
Palm Oil Fatty Acid (c.l.)	lb.	.11½	- .14½
Potassium Oleate (drums)	lb.	——	- **.29½**
Red Lead			
Eagle	lb.	——	- .1975
No. 2 RM (dlvd.)	lb.	——	- .1975
Sodium Laurate (drums)	lb.	——	- .19
Sodium Oleate—Powder (drums)	lb.	——	- .35
Paste (drums)	lb.	——	- .20
Sodium Stearate—Powder (drums)	lb.	——	- .35
USP Grade (drums)	lb.	——	- .37
Stearic Acid, Single Pressed			
Emersol 110 (dlvd.)	lb.	.18½	- .19¼
Groco 53	lb.	.18½	- .19¼
Stearex B (dlvd.)	lb.	.15½	- .16¾
Stearic Acid, Double Pressed			
Alba (dlvd.)	lb.	.18¾	- .21
Groco 54	lb.	.19¼	- .20¾
S-2-A (dlvd.)	lb.	.16½	- .18¾
S-2-B (dlvd.)	lb.	.15	- .17¼
Stearic Acid, Other			
Neo-Fat 1-58	lb.	.1190	- .1315
1-60	lb.	.1400	- .1525
1-65	lb.	.1450	- .1575
White Lead Basic Carbonate	lb.	.17¾	- .18¾
White Lead Basic Sulfate	lb.	.13¼	- .14¼
Zinc Laurate (c.l.)	lb.	——	- **.29**
Laurex	lb.	.29	- .30
Zinc Stearate	lb.	.39	- .41
Aquazinc	lb.	**.20**	- **.35**

Unclassified Activators

Actifat (dms.)	lb.	——	- **.18**
Aero Ac 50	lb.	**.50**	- **.56**
Aktone	lb.	.20	- .21
Barak	lb.	——	- **.60**
Curade	lb.	.57	- .59
D-B-A	lb.	——	- 1.95
Deiac T	lb.	**.55**	- **.57**
Dibutylamine (dlvd.)	lb.	**.49**	- **.52½**
MODX-B	lb.	.20	- .25
NA-11	lb.	——	- **.65**
Palmalene (drums)	lb.	——	- .15
Polyac	lb.	——	- 1.60
Ridacto (drums)	lb.	**.22**	- **.24**
Snodotte (dlvd.)	lb.	.16½	- .17¼
SOAC (min. 10 dms.)	cwt.	——	- 8.00
SOAC-KL (min. 10 dms.)	cwt.	——	- 8.00
Vuiklor	lb.	.75	- .85

ANTI-COAGULANTS

Anhydrous Ammonia (l.c.l.)	lb.	**.17**	- **.21**
Aqua Ammonia (dms.)	lb.	.031	- .035
M.B.M. (l.c.l.)	lb.	——	- **.35**

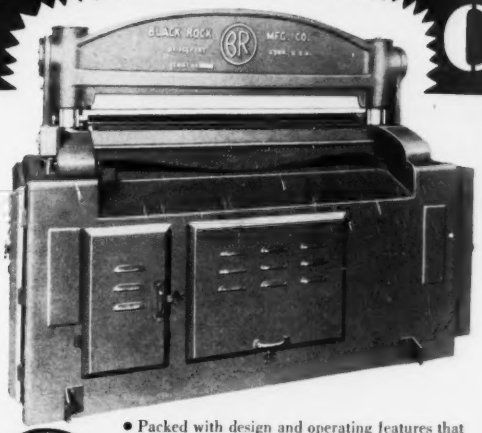
ANTI-FOAMING AGENTS

Aero Anti Foam H	lb.	——	- .12½
Regular	lb.	——	- **.08½**
D.C. Antifoam A	lb.	5.65	- 6.65
Defoamer 630	lb.	——	- .12½
Modicol A	lb.	.12	- .15
B	lb.	.35	- .40

ANTI-OXIDANTS

Agerite Alba	lb.	2.20	- 2.30
Gel	lb.	.60	- .62
Hipar	lb.	.91	- .93
H. P.	lb.	.67	- .69
Powder	lb.	.49	- .51
Resin	lb.	.65	- .67
Resin D	lb.	.49	- .51
Stalite	lb.	.49	- .51
White	lb.	1.40	- 1.50
Akroflex C	lb.	.67	- .69
F	lb.	.67	- .69
Aminox	lb.	.49	- .51
Antioxidant 2246	lb.	1.60	- 1.70
Antox	lb.	.46	- .48
Aranox	lb.	——	- 3.25
Benzoquinone	lb.	**1.50**	- **1.75**
Betanox Special	lb.	.70	- .72
B-L-E	lb.	.49	- .51
Carvacrol	lb.	——	- .78
Deenax	lb.	.95	- 1.05
Eugenol C-95%	lb.	——	- 1.65
Flectol H	lb.	.49	- .56
Flexamine	lb.	.67	- .69
Hydroquinone	lb.	——	- .90
Neozone Standard	lb.	——	- .82
A	lb.	.51	- .53
C	lb.	——	- .67
D	lb.	.49	- .51

GREATER CUTTING CAPACITY!



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Black Rock leads the way with the NEW 4M-48 GUILLOTINE CUTTER for cutting RUBBER—PLASTICS—PAPERBOARD

The 4M-48 (illustrated) cuts material 48" wide, Sheet or Slab stock. Other models cut material widths 18", 24" and 36".
Various types of stock measuring, knife actuating and conveyor arrangements can be supplied.
Send us information on your minimum and maximum requirements . . . it will be a pleasure to quote you!

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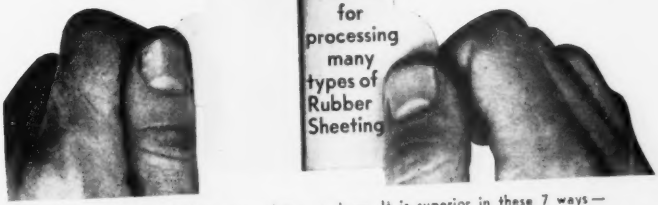
BLACK ROCK MFG. CO.
179 Osborne Street Bridgeport 5, Conn.
Pacific Rep. Lombard Smith, Los Angeles, Cal.
N. Y. Office, 261 Broadway

A Shining Example



BRATEX Rubber Holland never lets you down. It is superior in these 7 ways—surface gloss—uniform caliper—tightly filled—minimum surface load—non-flaking—pliable—peels off clean.

Three standard qualities. 20 and 40 inches wide, in 100 and 250 yard rolls. Special size rolls to order.

Write for Samples and Prices.

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THE HOLLISTON MILLS, INC., Norwood, Mass.

REPRESENTATIVES: The B. E. Dougnerty Co., 1807 East Olympic Blvd., Los Angeles 21, Cal. • N. A. Gibbons Co., 304 Evans Bank Bldg., Akron 8, Ohio

ANTI-OXIDANTS (Cont'd)

Oxidex	lb.	——	5.00
Parazone	**lb.**	**——**	**.75**
PDA-10	**lb.**	**.36**	**.38**
PDA-20	**lb.**	**.36**	**.38**
Permalux	lb.	——	1.85
Resorcin, Tech. (dlvd.)	**lb.**	**——**	**.64**
Santoflex AW	lb.	.66	.73
B	lb.	.49	.56
BX	lb.	.60	.67
AS	lb.	.67	.74
Santovar-A	lb.	1.40	1.47
O	lb.	1.20	1.27
Santowhite Crystals	lb.	1.55	1.62
Santowhite L	lb.	.49	.56
MK	lb.	1.25	1.32
S.C.R. (tons)	**lb.**	**.32**	**.34**
Stabilite	lb.	.49	.51
Alba	lb.	.69	.74
L	lb.	.60	.62
White	lb.	.49	.51
Stabilizer No. 1	lb.	——	1.55
Stabilizer No. 320	lb.	——	.75
Sunolite	lb.	.20	.23
Tannic Acid, Tech	lb.	.46	.48
Thermoflex A	lb.	1.61	1.63
A	lb.	.98	1.00
Thymol Eugenol	lb.	——	1.08
U.S.P.	lb.	——	3.25
V-G-B	lb.	.65	.67
Wing-Stay S	lb.	.48	.49

ANTI-SCORCHING AGENTS

Armeen HT	lb.	.34	.42
Benzoic Acid—Tech.	**lb.**	**——**	**.43**
Good-rite Vultrol	lb.	.55	.57
Sodium Acetate 60-62% Crystals	lb.	——	.06

ANTISEPTICS AND GERMICIDES

Arquad S	lb.	.22	.25
Formaldehyde (dms.)	lb.	——	.062
G-4 (dbls.)	lb.	.95	2.95
G-11	lb.	——	3.45
Nuodex 100 S.S. (dlvd.)	**lb.**	**——**	**1.05**
Nuodex 100 W.D. (dlvd.)	lb.	——	1.20
Nuodex Zinc 8% (dms.) (dlvd.)	lb.	——	.2125
Ortho Cresol (26°-27°)	lb.	——	.18
Retarder D	lb.	.42	.50
Soligen Drier—Copper 8% (drums)	lb.	——	.22¼
Zinc 8% (dms.)	lb.	——	.21¼
Vancide	lb.	——	.80

ANTI-WEBBING AGENTS (for Latex)

Webnox 33	lb.	1.50	2.25
34	lb.	1.75	2.25

AROMATICS (DEODORANTS)

Bouquet 149	lb.	——	3.00
Coumarin	lb.	——	2.75
Curodex 19	lb.	——	4.75
188	lb.	——	5.75
198	lb.	——	6.75
D-6 Masking Perfume	lb.	——	1.35
Deodorant 65	lb.	——	1.00
Deodorant L-37	lb.	2.00	2.40
L-44	lb.	2.50	2.90
N.L.T.X.	lb.	1.85	2.15
Deodorant Oil GD 3427	lb.	1.70	2.00
4440	lb.	3.00	3.50
5296	lb.	1.30	1.60
General Deodorant 18301	**lb.**	**——**	**2.40**
Latex Perfume 5	lb.	——	3.25
6	lb.	——	7.50
9	lb.	——	.65
Naugaromes (dms.)	**lb.**	**1.50**	**3.00**
Neutrodor 33	lb.	2.00	2.50
Neutroleum Delta	lb.	——	2.60
Gamma	lb.	——	3.60
Parador A	**lb.**	**1.75**	**2.25**
B	lb.	.70	1.00
C	lb.	2.75	3.25
D	lb.	1.50	2.00
E	lb.	.25	.55
F	lb.	.35	.47
GD 5380	lb.	2.00	2.50
GD 5348	lb.	1.90	3.25
J	lb.	1.75	2.25
K	lb.	.45	.60
Perfume Oil Bouquet Vanilla M	lb.	2.40	2.75
Resodor 31	lb.	2.00	2.50
12	lb.	1.45	1.75
Rodo No 0	lb.	4.00	4.50
No. 10	lb.	5.00	5.50
Rubbatone (dms.)	lb.	3.00	3.80
Rubber Perfume 11	lb.	——	2.85
Russian Leather 7	**lb.**	**——**	**4.10**
Vanillin	lb.	3.90	4.05

BLOWING AGENTS

Ammonium Bicarbonate (dlvd.)	lb.	.0725	.1075
Blowing Agent CP-975	**lb.**	**——**	**.35**
Sodium Bicarbonate, U.S.P. (c.l., bags)	cwt.	——	1.95
Sponge Paste	**lb.**	**——**	**.20**
Unicel	lb.	——	.82
ND	lb.	——	1.40
S	lb.	——	.20
Urea	lb.	.0425	.0475

BONDING AGENTS

Durez 12987	lb.	.48	.53
Interlake Resin No. 4162	lb.	——	1.50
MDI	**lb.**	**7.00**	**7.75**
50	lb.	3.50	4.00
Pliobond 20	gal.	2.75	4.00
30	gal.	3.45	4.70
Reanite	gal.	6.75	7.25
Rex Compounds	**gal.**	**1.30**	**2.85**
Ty-Ply Q (BN & S)	gal.	6.75	8.00

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	8.11	8.61
Glacial—99½% (bbls.)	cwt.	14.05	14.55
Calcium Nitrate, Tech.., Crystals	lb.	.07	.17
Hydroxyacetic Acid—70% (dms.)	lb.	——	.084
Zinc Nitrate, Tech.	lb.	——	.22¼

COLORING AGENTS

Black

Aquablak B (also M, R)	lb.	.0725	.0875
Aquablak S	**lb.**	**.08½**	**.09**
Black Shield 4-35 (dms.)	lb.	——	.0825
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10	lb.	.06	.09
Mapico Black Iron Oxide (50 lb. bags)	lb.	.1100	.1125
Raven Black Pure Iron Oxide	cwt.	11.00	11.25

Blue

Blue GD, Dispersed	lb.	——	4.55
Blue GD Paste	lb.	——	1.80
Blue VD, Dispersed	lb.	——	2.75
Mikori Blue 11840 (dlvd.)	lb.	——	.37
Monastral Fast Blue CPL	lb.	——	1.77
PCD, Dispersed	lb.	——	2.50
Ramapo Blue	lb.	3.40	3.45
Rubber Blue X-1999	lb.	——	1.35
Stan-Tone Blue	**lb.**	**1.40**	**4.00**
Ultramarine	lb.	.14	.30
Vansul Blue M.B.	lb.	.90	2.40
Victoria Blue BP-262-D	lb.	2.25	2.30

Brown

Brown Iron Oxide	lb.	.12	.1225
Mapico Brown (50 lb. bags)	lb.	.1225	.1250

Green

Filo Green D-700 (and D-705)	lb.	——	.30
Green Chromium Oxide, Pure	cwt.	34.50	40.50
Green Chromium Oxide, Pure, Hydrated	cwt.	85.00	100.00
Green FD, Dispersed	lb.	——	1.85
Monastral Fast Green GSD, Dispersed	lb.	——	3.20
GSL	lb.	——	1.97
Permansa Green CP-594	lb.	——	1.35
Pigment Green B	lb.	——	1.35
GL-652D	lb.	.88	.93
Ramapo Green	lb.	——	4.00
Rubber Green X-1292	lb.	——	1.00
Stan-Tone Green	lb.	1.50	3.30
Vansul Green M.B.	lb.	1.05	2.45

Maroon

Stan-Tone Maroon	lb.	3.00	3.05
Vansul Maroon M.B.	lb.	1.05	2.80

Orange

Molybdate Orange	lb.	——	.43
Orange FD, Dispersed	**lb.**	**——**	**2.75**
Rubber Orange X-2065	lb.	——	2.60
Stan-Tone Orange	lb.	1.65	4.00
Vansul Orange M.B.	lb.	2.15	3.15

Red

Antimony Trisulfide	lb.	.55	.68
R. M. P. Sulfur Free	lb.	.63	.68
R. M. P. No. 3	lb.	.55	.60
Cadmium Red	lb.	.95	1.25
Cadmolith Red (dbls.)	lb.	1.30	1.55
Graphic Red (dlvd.)	lb.	——	.80
Indian Red, American, Pure	cwt.	11.75	12.00
Dooco (English)	cwt.	11.50	11.75
Mapico Reds (50 lb. bags)	lb.	.1175	.12
Oximony Iron Oxide	lb.	——	.09
Red Iron Oxide, Light	cwt.	11.75	12.00
Red PBD, Dispersed	lb.	——	1.75
2BD, Dispersed	lb.	——	1.80
2RL	lb.	——	1.32
3BL	lb.	——	1.65
Rubanox Red CP-762 (dlvd.)	lb.	——	1.40
Rubber Red CP-339 (dlvd.)	lb.	——	1.05
Rubber Red RT-364	lb.	——	.75
Rubber Red RT-425	lb.	——	.75
Rubber Red X-1148	lb.	——	.80
Rubbered	lb.	.1150	.1175
Solfast Red CP-663 (dlvd.)	lb.	——	1.80
CP-787 (dlvd.)	lb.	——	1.30
Stan-Tone Red	**lb.**	**1.10**	**3.05**
Sun Burnt Red	lb.	.1150	.1175
Vansul Red M.B.	lb.	.90	2.60
Watchung Red	lb.	——	1.90

White—Lithopone

Albalith	lb.	.07	.08
Astrolith	lb.	.06½	.07¼
Cryptone BT	lb.	.09	.10
Eagle	lb.	.06¼	.06½
Permalith	lb.	.06¼	.06¾
Ponolith	lb.	.07	.07¾
Sunolith	lb.	.06½	.07¼

White—Titanium Pigments

Ti-Cal	lb.	.07¾	.08¼
Ti-Pure	lb.	.21½	.22½
Titanox A—all grades (dlvd.)	lb.	.19½	.20¼
RA (dlvd.)	lb.	.21½	.22½
RA-10 (dlvd.)	lb.	.21½	.22½
RA-NC (dlvd.)	lb.	.21½	.22½
RC (dlvd.)	lb.	.07¾	.08¼
RC-HT (dlvd.)	lb.	.07¾	.08
Unitane O-220	**lb.**	**.195**	**.205**
OR-250	lb.	.215	.225
Zopaque	**lb.**	**.19½**	**.20½**

White—Zinc Oxide (American Process)

AZO-ZZZ 11 (and 22, 33, 44, 55)	lb.	.16	.17
Eagle	lb.	.16	.17
Horse Head Special	lb.	.16	.17
XX Red	lb.	.16	.17
XX-505	lb.	.17½	.18½
Protox 166	lb.	.16	.17
167	lb.	.16	.17
St. Joe Black Label	lb.	.16	.17
Green Label	lb.	.16	.17
Red Label	lb.	.16	.17

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	——	13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.18¼	.19½
Eagle Green Seal	lb.	.17¼	.18¼
Eagle Red Seal	lb.	.17¼	.18½
Eagle White Seal	lb.	.18¼	.19¼
Florence Green Seal	lb.	.17¼	.19¼
Red Seal	lb.	.17¼	.18½
White Seal	lb.	.18¼	.19¼
Kadox 25	lb.	.18¼	.19¼
Kadox 15, 17 and 72	lb.	.16	.17
U. S. P. 12	lb.	.19¼	.20¼

White—Zinc Sulfide

Cryptone ZS-800	lb.	.24	.25

Yellow

Anchor Brand Pure Iron Oxide	cwt.	9.00	9.25
Cadmolith Yellow (bbls.)	**lb.**	**——**	**.95**
Chrome Yellow	lb.	——	.30
Chrome Yellow 12310	lb.	——	.28
Ferrox	cwt.	7.50	8.50
Mapico Yellow (50 lb. bags)	lb.	.0950	.0975
Rubber Yellow X-1940	lb.	——	1.60
Stan-Tone Yellow	lb.	1.60	2.25
Tolindine Yellow	lb.	——	1.91
YL-556-D	lb.	——	.82
Oximony Iron Oxide	lb.	——	.06¾
Vansul Yellow M.B.	lb.	.95	1.55
Yellow GD, Dispersed	lb.	——	2.15
GL	lb.	——	1.62
Zinc Yellow	lb.	——	.25

DISPERSING AGENTS

Aschem SA-19	lb.	——	.30
SA-20	lb.	——	.70
Anchoid*	lb.	.24	.25
Armeen 18	lb.	.42	.56
Beacomol 52	lb.	.60	.75
Darvan No. 1 and No. 2	lb.	.31	.40
Daxad 11 (21, 23)	lb.	.08	.35
Dilex	lb.	——	.32
Dispersaid	lb.	1.25	1.35
Furala	lb.	.06½	.07½
Halloid	lb.	.04½	.05½
HornKem No. 1	gal.	——	1.60
No. 3G	gal.	——	1.75
No. 12	lb.	——	.17
Marasperse C	lb.	.06	.06½
CB	lb.	.11½	.13½
N	lb.	.09	.10
Modicol C	lb.	.08	.12
Rubbex	lb.	——	.27½
Stan-Chem BQC	lb.	.12¼	.17¼
1067	lb.	——	.13½
1471	lb.	.1687	.2187
2251	lb.	.12¼	.17¼
Trenamine D-25	**lb.**	**.32½**	**.36**
Triethanolamine (drums) (dlvd.)	lb.	.21½	.22½
Yelkin TT	lb.	.14	.18
Zinsper	lb.	——	.15

EXTENDERS

Advagum 1098	lb.	——	.64
Bunaweld Polytuer No. 780	**lb.**	**——**	**.22**
No. 5514	lb.	——	.35
D-92 (and D-93) (dms.)	lb.	——	.12
Extender 600	lb.	——	.1480
PR-162 Latex (dms.)	gal.	1.00	1.60
Synprolac	lb.	——	.19
Synprowax	lb.	.16	.19
Vistanex	lb.	——	.32

CRUDE RUBBER

Synthetic Rubber
Liquid Latex

•

THE SOUTH ASIA CORP.

Importers-Dealers Crude Rubber
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Vulcanized Oil

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite	lb.	.15	- .95
Lionite	lb.	.09¾	- .90
Pumice	lb.	.03	- .05
Aluminum Hydrate	lb.	.07	- .10
Aluminum Silicate			
Silical	ton	37.00	- 55.00
Marter White	ton	18.50	- 30.00
Barium Carbonate (l.c.l.)	ton	72.50	- 90.00
Barytes			
No. 1 Floated, White	ton	37.60	- 52.40
No. 2 Floated, Unbleached	ton	35.60	- 50.40
No. 22 Barytes (c.l.)	ton	—	- 18.37
Foam A	ton	—	- 34.85
Bentonite (c.l.)	ton	—	- 11.50
SPV Volclay (c.l.)	ton	—	- 11.50
Blanc Fixe	ton	72.50	-120.00
Calcium Carbonate			
Atomite (c.l.)	ton	—	- 30.00
B.I. White No. 1 (c.l.)	ton	—	- 7.50
B.I. White No. 2 (c.l.)	ton	—	- 7.00
B.I. White No. 390 (c.l.)	ton	—	- 5.75
Blue Star XX	ton	—	- 15.00
Calcene T	ton	60.00	- 70.00
Caltec	ton	40.00	- 57.50
Calwhite	ton	—	- 17.00
Camelwite	ton	—	- 30.00
Camaco	ton	—	- 30.00
Kalite (c.l.)	ton	—	- 40.00
Laminar	ton	—	- 30.00
Lesamite (c.l.)	ton	—	- 27.50
Lim-Cal (c.l.)	ton	—	- 12.50
Millical (c.l.)	ton	—	- 27.50
Multifex	ton	—	-105.00
Non-Fer Al	ton	—	- 20.00
Purecal M	ton	45.00	- 60.00
U	ton	120.00	-135.00
Sierracal	ton	15.00	- 18.50
Super Multifex	ton	—	-145.00
Surfex (c.l.)	ton	—	- 30.00
Suspenso (c.l.)	ton	—	- 22.00
Witcarb R (c.l.)	ton	110.00	-120.00
R-12 (c.l.)	ton	71.00	- 76.00
York White	ton	—	- 9.00
Calcium Silicate			
Silene EF	ton	120.00	-130.00
L	ton	125.00	-135.00
Calcium Sulfate, Anhydrous			
Snow White Filler	ton	—	- 18.00
Calcium Sulfate, Hydrous			
Crysta-Cal (c.l.)	ton	—	- 12.50
Terra Alba No. 1	ton	12.00	- 14.40
Chalk Whiting (l.c.l.)	lb.	.0150	- .0175
Recco Paris Whiting	ton	—	- 28.00
Clay			
Alsilite (c.l.)	ton	14.00	- 22.50
Alsite (c.l.)	ton	—	- 14.00
Aluminum Flake	ton	22.50	- 60.00
A.S.P. No. 1 (c.l.)	ton	—	- 35.00
No. 11 (c.l.)	ton	—	- 40.00
Bisca (c.l.)	ton	—	- 45.00
Burgess No. 20	ton	—	- 35.00
No. 30	ton	—	- 37.00
Burgess Iceberg	ton	—	- 50.00
Burgess Polyclay	ton	—	- 45.00
Catalpo (c.l.)	ton	—	- 35.00
Champion	ton	—	- 14.00
C.S.D. (c.l.)	ton	—	- 13.50
Crown	ton	—	- 14.00
Dixie (c.l.)	ton	—	- 14.00
Hi-White R	ton	—	- 13.50
Hydratex R	ton	—	- 30.00
Kaolloid Clay (c.l.)	ton	—	- 10.50
Merkham (c.l.)	ton	14.00	- 35.00
McNamee (c.l.)	ton	—	- 13.50
Oldham (c.l.)	ton	13.50	- 35.00
Paragon	ton	—	- 13.50
Pigment 5	ton	21.85	- 36.00
Pigment 22	ton	16.50	- 22.50
Pigment 33	ton	—	- 37.00
Recco (c.l.)	ton	—	- 14.00
RX 43	ton	—	- 33.00
Stan-Clay	ton	25.00	- 30.00
Stellar-R	ton	—	- 50.00
Suprex	ton	—	- 14.00
Upton	ton	19.50	- 21.50
Whitetex (c.l.)	ton	—	- 50.00
Witco No. 1 (c.l.)	ton	14.00	- 37.50
No. 2 (c.l.)	ton	14.00	- 37.50
Diatomaceous Earth	ton	30.00	- 50.00
Kaylorite (c.l.)	ton	—	- 30.00
Lorite	ton	—	- 30.00
Dolomite (c.l.)	ton	11.00	- 12.00
Flock			
Cotton, white and colored	lb.	.10	- .22
Filfloc F 40-9000	lb.	—	- .16
Filfloc F 6000	lb.	—	- .22
Polyeel	ton	145.00	-178.00
Rayon, bleached or dyed	lb.	.81	- 1.50
Rayon, grey	lb.	—	- .18
Rayon, pink	lb.	—	- .14
Solka-Floc (l.c.l.)	lb.	.05½	- .15
Wool, bleached or dyed	lb.	.70	- 1.00
Glue, Bone (dlvd.)	lb.	.18	- .20½
Graphite	lb.	.05	- .20
Leather, Shredded	lb.	.05	- .17
Lignin	lb.	.03	- .06
Indulin	lb.	.09	- .10
Limestone, Pulverized	ton	3.25	- 10.00
Industrial Filler No. 100 ton		—	- 5.75
Micro Velva	ton	45.00	- 47.00
Velvet Filler, Regular	ton	20.00	- 22.00
Magnesium Carbonate	lb.	.0950	- .1050
K & M Clearcarb	lb.	.1225	- .1275
Magnesium Oxide	lb.	.05	- .06

FILLERS (Cont'd)

Magnesium Silicate	ton	18.00	- 35.00
Aitex	ton	25.00	- 27.00
Asbestol	ton	20.00	- 22.00
Blue Star Talc	ton	—	- 23.00
L.S. Silver	ton	23.50	- 25.50
Sierra White	ton	21.25	- 23.25
Mica	lb.	.01½	- .07¾
Concord	lb.	.02	- .07¾
Micro-Mica	lb.	.06¾	- .07½
Mineralite (c.l.)	ton	25.00	- 40.00
Silversheen	lb.	.07	- .07¾
Triple A Mica (c.l.)	ton	—	- 25.00
Vermiculite	lb.	.075	- .085
Wet Ground Biotite Mica	lb.	.05½	- .06¼
Wet Ground Mica No. 160	lb.	.07	- .07¾
Pyrophyllite			
Pyrax A (c.l.)	ton	—	- 12.50
WA (c.l.)	ton	—	- 15.00
Silica	ton	16.00	- 27.00
Blue Star	ton	—	- 21.50
Slate, Powdered (l.c.l.)	ton	15.00	- 20.00
Talc, Domestic	ton	10.00	- 27.00
Nytal 200	ton	23.00	- 40.00
300	ton	35.00	- 52.00
Walnut Shell Flour	ton	45.00	-111.00
Whiting, Commercial	ton	—	- 7.00
Cameline (c.l.)	ton	8.50	- 10.00
C-C-O White	ton	—	- 17.00
Keystone (c.l.)	ton	—	- 16.00
Rambo No. 1 White	ton	—	- 8.50
No. 6 White	ton	—	- 9.00
Snowflake (c.l.)	ton	—	- 18.00
Veroc (c.l.)	ton	—	- 8.50
Weico (c.l.)	ton	—	- 7.50
York White R (c.l.)	ton	—	- 8.00
Wood Flour	ton	22.00	- 49.00

FINISHING MATERIALS, SURFACE

Beaco Finishes	gal.	1.05	- 1.35
Black Out	gal.	4.50	- 8.00
Shellac, Orange Gum	lb.	.45	- .54
VanWax	gal.	1.25	- 1.30

LUBRICANTS, MOLD

Aquadag	lb.	3.15	- 3.45
Aquarex D	lb.	—	- .76
L Paste	lb.	—	- .85
MF	lb.	—	- .92
MDL Paste	lb.	—	- .30
WA Paste	lb.	—	- .25
Akro Gel	lb.	—	- .165
Borax, Granular (l.c.l.)	ton	81.00	- 86.00
Carbowax 4000	lb.	.31	- .35
Colite Concentrate (dms.)	gal.	—	- .90
Concentrex	lb.	—	- .25
D.C. 7 Compound	lb.	6.20	- 6.80
D.C. Emulsion No. 35	lb.	1.68	- 3.50
35A	lb.	1.68	- 3.50
35B	lb.	1.68	- 3.50
D.C. Mold Release Fluid	lb.	4.14	- 6.00
Dipex	lb.	.14	- .18
Dri-Lube	lb.	—	- .22
Erlen Mold Lubricant	gal.	1.25	- 1.50
Glydag	gal.	1.30	- 2.00
Hawkeye Flake (dlvd.)	lb.	—	- .12
Kokobace	lb.	—	- .12
Latex-Lube GR (dlvd.)	lb.	.18½	- .19¼
R-66 (dlvd.)	lb.	—	- .15
Liqui-Lube (dlvd.)	lb.	—	- .14¼
NF (dlvd.)	lb.	—	- .15¼
NT (dlvd.)	lb.	—	- .15¼
Lubrex	lb.	.25	- .30
Lubri-Flo	gal.	10.00	- 12.00
Migralube	lb.	—	- .35
Mold Lubricant No. 72			
Conc.	gal.	2.50	- 4.00
No. 735	gal.	1.26	- 2.75
Moldeze No. 1	gal.	—	- 36.00
No. 3	gal.	—	- 7.50
Mold-Brite	gal.	—	- 1.50
Mold-Slick	lb.	.202	- .215
Mold-White	gal.	—	- 2.00
Nopcolube	lb.	—	- .15
Orvus WA Paste (dms.)	lb.	—	- .25
Prodag	lb.	.25	- .38
Purity Flake (dlvd.)	lb.	—	- .14
Redotex Flakes (dlvd.)	lb.	.19⅝	- .20
Powder (dlvd.)	lb.	.20⅛	- .20½
Rubber-Flo	gal.	1.15	- 1.50
Rubber-Glo	gal.	—	- .94
Rusco Mold Paste	lb.	—	- .25
Sericite (l.c.l.)	ton	65.00	- 75.00
Thermalube	lb.	—	- .11
Uco Mold Soap	lb.	.12	- .13
Uco Lubricants	gal.	.27½	- .35½
Werkrite Flakes (dlvd.)	lb.	.17⅝	- .18
Powder (dlvd.)	lb.	.18⅛	- .18¼

LUBRICANTS, RUBBER

Extrud-o-Lube	gal.	—	- 1.57
G.B. Naphthenic Neutrals	gal.	.11	- .18
Propylene Stearate (drums)	lb.	—	- .40

LUBRICANTS, RUBBER SURFACE

Barium Stearate	lb.	.39	- .41
Calcium Stearate	lb.	.37	- .39
Glycerized Lubricant	gal.	—	- 1.25
Polyethylene Glycol	lb.	—	- .23
Rexanol	lb.	—	- .13
Separex	lb.	—	- .25
Slab-Dip	lb.	—	- .15
Wet-Zinc	lb.	—	- .23¼
Zinc Stearate	lb.	.34	- .36

MOLD CLEANERS

Actusol (dlvd.)	gal.	1.40	- 1.60
Metso 99	cwt.	4.00	- 5.85
Granular	cwt.	3.50	- 5.15
Rubber-Sol	gal.	2.75	- 3.25
Shelblast	ton	80.00	-140.00
Sprex A.C. (dlvd.)	lb.	.15¼	- .15½

PEPTIZING AGENTS

Peptizer P-12	lb.	.84	- 1.00
RPA 2	lb.	—	- .63
3	lb.	—	- .46
3-RO	lb.	—	- .49
5	lb.	—	- .57

PLASTICIZERS & SOFTENERS

AA (drums)	lb.	.23	- .29
Acto 500	lb.	—	- .09
Adipol BCA (dms.)	lb.	.43½	- .44
2EH	lb.	.42	- .43
10A	lb.	.42	- .45
American Pine Tar	lb.	.0350	- .0473
Amrel	lb.	.22	- .27
Arolene 1980 (c.l.)	lb.	—	- .10
Aromatic Tar	gal.	.0573	- .1973
Bardol	lb.	.02¼	- .03¾
B	lb.	.05¾	- .06
Bayol D	gal.	—	- .382
F	gal.	—	- .52
Beeswax, Refined & Bleached	lb.	.60	- .65
Yellow Refined	lb.	.52	- .55
Bondogen	lb.	.55	- .60
B.R.C. No. 20	lb.	.0150	- .0160
B.R.H. 2	lb.	.0280	- .0290
BRS 700	lb.	.0175	- .0260
B.R.T. 3	lb.	.024	- .025
4	lb.	.0225	- .023
7	lb.	.0265	- .027
B.R.V.	lb.	.0350	- .0515
Bunarex Resins	lb.	.05¼	- .06½
Bunatak AH	lb.	.08	- .09
17	lb.	—	- .15
No. 90	lb.	—	- .08
No. 210	lb.	—	- .12
Burgundy Pitch	lb.	.1026	- .105
Butac	lb.	.10¾	- .11½
Butoxyethyl Diglycol Carbonate	lb.	.40	- .41
Butyl Benzyl Sebacate	lb.	.61	- .63¾
Butyl Carbitol Perlargonate (dms.)	lb.	—	- .643
Butyl Cellosolve Perlargonate (dms.)	lb.	—	- .68
Butyl Palmitate	lb.	—	- .26½
Butyl Roleate	lb.	.176	- .18
Butyl Stearate-CP (dms.)	lb.	.31	- .33¾
BWH-1	lb.	—	- .14
Cabflex Di-BA (dms.)	lb.	.38½	- .39½
Di-OA (dms.)	lb.	.42	- .43
Di-OP (dms.)	lb.	.37½	- .38½
Califlux 510, 550	lb.	.025	- .0325
G.P.	lb.	.0125	- .02
R-100	lb.	.04½	- .05¼
TT	lb.	.02	- .02¾
Campol (t.c.)	ton	—	- 42.00
Candelilla Wax Prime	lb.	.67	- .75
Caprol Benzyl Sebacate	lb.	.67½	- .70½
Carbonex	lb.	.0325	- .0375
S Flakes	lb.	.04	- .0475
S Plastic	lb.	.0410	- .0460
644	lb.	.0375	- .0425
Carbowax 4000 (drums)	lb.	—	- .29
Cardolite 615	lb.	.33¾	- .36¾
816	lb.	.25¾	- .28¾
Carnauba Wax, Crude	lb.	.80	- 1.04
Refined	lb.	.87	- .94
Substitute	lb.	.45	- 1.08
Yellow	lb.	1.15	- 1.20
Celluflex	lb.	.36½	- .38½
Ceresine Wax	lb.	.14	- .26
Chlorowax 40	lb.	.12½	- .13¼
Contogum	lb.	.06¾	- .10¼
CTLA Polymer	gal.	.17½	- .32½
Cumar Resins	lb.	.05½	- .14½
D.C. 200 Fluid	lb.	4.14	- 6.00
D.B.M.	lb.	—	- .30
Degras, Common	lb.	—	- .12
Diamylphenol (l.c.l., dms.)	lb.	—	- .28
Dibenzyl Sebacate	lb.	.74	- .76½
Dibutoxethyl Sebacate	lb.	—	- .3634
Dibutyl Phthalate	lb.	.29¼	- .32
Dibutyl Sebacate—Tech.	lb.	.59	- .61¾
C.P.	lb.	.61	- .63¾
Dicapryl Adipate	lb.	.40½	- .43¼
Dicapryl Phthalate	lb.	.37	- .39¾
Dicapryl Sebacate	lb.	.61½	- .64¼
Di-Carbitol Phthalate (dms.)	lb.	.41½	- .42
Dicyclohexyl Phthalate	lb.	—	- .42
Dielex	lb.	.0625	- .0650
Diethyl Phthalate (t.c.)	lb.	—	- .24
Di-2-ethlyhexyl Phthalate (t.c.)	lb.	—	- .37
Dihexyl Adipate	lb.	.33	- .35¾
Dihexyl Phthalate	lb.	.28½	- .31¼
Dihexyl Sebacate	lb.	.50	- .52¾
Di Isobutyl Azelate (dms.)	lb.	.54	- .57
Di-iso-octyl Adipate (dms.)	lb.	.40½	- .43¾
Di-iso-octyl Phthalate (t.c.)	lb.	.37	- .39¾
Dimethyl Phthalate (t.c.)	lb.	—	- .23
Dimethyl Sebacate	lb.	.77	- .79¾
Dioctyl Phthalate (dms.)	lb.	.37	- .39¾
Dioctyl Sebacate (dms.)	lb.	.62½	- .65¼
D.I.O.P. (dms.)	lb.	.36	- .38½
Dipolymer Oil	gal.	.33	- .38

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PLASTICIZERS & SOFTENERS (Cont'd)

Dispersing Oil No. 10	lb.	.05½	.05¾
Dutrex A (B, 5, 6)	**lb.**	**.02½ -**	**.03¼**
15	gal.	.10 -	.189
20, 21, 25	**lb.**	**— —**	**.03**
ELA	lb.	.35 -	.80
Elastex 10-P	lb.	.40 -	.42½
50-B	lb.	.34½ -	.37
DCHP	lb.	.42½ -	.43½
Estac	lb.	— —	.16
Ethox (dms.)	lb.	.41½ -	.42
Flexol B 460	lb.	.27 -	.29
DHP	lb.	.35 -	.37½
DOP	lb.	.37 -	.39½
TOF	lb.	.41½ -	.44
3GH	lb.	.42 -	.44
3GO	lb.	.51¼ -	.53½
4GO	lb.	.36 -	.38½
8HP	lb.	.38 -	.40½
8NS	lb.	.34 -	.36½
EWS	lb.	.38 -	.40½
Galex W-100	**lb.**	**.13½ -**	**.15**
G. B. Light Process Oil	**lb.**	**.025 -**	**.0325**
G. B. Naphthenic Neu trals	gal.	.11 -	.18
Good-Rite GP233	gal.	.41½ -	.44¾
GP261	gal.	.37 -	.39¼
Hartflex 500 (dms.)	lb.	.36½ -	.39¼
Hercolyn (dfwd.)	lb.	.16 -	.16½
Herron-H.T.	**gal.**	**.2400 -**	**.2700**
Herron-Plas	**lb.**	**.0350 -**	**.0375**
Herron-Wax	**lb.**	**.0500 -**	**.0550**
HSC No. 13	lb.	.27 -	.30
Hylene B	lb.	.45 -	.50
C	lb.	.41 -	.46
D	lb.	.47½ -	.52½
Indonex 632½ (633½, 634½, 638½)	gal.	.1100 -	.1700
IMH	**lb.**	**— —**	**.85**
Kalpsol	lb.	.15½ -	.36
Kenflex	lb.	.22 -	.27
KP 23 (dms.)	lb.	.31½ -	.32½
70 (dms.)	lb.	.34 -	.34½
120 (dms.)	lb.	.37½ -	.38
140 (dms.)	lb.	.45½ -	.46
150 (dms.)	lb.	.29 -	.30
200	lb.	.41½ -	.42
Kremol 40	gal.	.36 -	.46
50	gal.	.36 -	.46
Kronsol (drums)	lb.	.35 -	.35½
Kronitex (drums)	lb.	.31½ -	.32½
Latolin, Tech. Anydrous	lb.	.21 -	.23
Lead Oleate	lb.	— -	.30½
Lindol	lb.	.29 -	.45
2-Mercaptoethanol (drums)	lb.	— —	.75
Methox (dms.)	lb.	.36½ -	.37
Methyl Laurate	**lb.**	**.25 -**	**.27**
Methyl Oleate	lb.	— —	.20
Methyl Stearate (dms.)	lb.	— —	.30
Modicol G	lb.	— —	.23
R	lb.	— —	.17
Montan Wax, Crude	lb.	.18 -	.20
Montan Wax (c.t.)	lb.	.15 -	.18
Monty Wax	lb.	— —	.30½
Mortbex No. 100	lb.	.17 -	.38¼
Natac	lb.	.10 -	.11
Neolene 210 (t.c.)	**lb.**	**— —**	**.16**
212 (t.c.)	**lb.**	**— —**	**.14**
220 (t.c.)	lb.	— —	.15
Nerium	lb.	— —	.09
Nevillac Resins (dms.)	lb.	.23 -	.45
Neville Resins (dms.)	**lb.**	**.10½ -**	**.15½**
Nevindene Resins (dms.)	lb.	.12½ -	.15½
Nevinol (dms.)	lb.	— —	.17
Nevoil	lb.	.02½ -	.03¼
Nevtex 10 (dms.)	lb.	.08¾ -	.10¾
Nuba 1 (and 2) (dms.)	lb.	— —	.04
JX (dms.)	lb.	.03¾ -	.06¼
15 (and 20) Oil (dms.)	lb.	— —	.22¾
No. 430 Oil Proof Resin	lb.	— —	.16
Oleopex Q10 (dms.)	lb.	.16½ -	.17¼
Opalwax	**lb.**	**.37 -**	**.38**
Ortho Nitrobiphenyl	lb.	.06 -	.11
Ozokerite Wax No. 64 White	lb.	.31 -	.32
Yellow	lb.	.25 -	.26
P-1 (and 4)	lb.	— —	.29
P-18	lb.	— —	.38½
P-24	lb.	— —	.28
P-75	lb.	.66 -	.72
Pale 1 (and 3000)	lb.	.25 -	.28½
Palm Oil	lb.	— —	.11
Paradene Resins (dms.)	lb.	.03 -	.06
Para Flex (dms.)	gal.	.1825 -	.1925
2010 (dms.)	gal.	.22 -	.23
Para Lube (t.c.)	lb.	.046 -	.048
Parmo	lb.	.06 -	.13½
Peptop 22	lb.	**.72 -**	**.75**
PG-16 (drums)	**lb.**	**— —**	**.23½**
Picco 30 (and 25)	lb.	— —	.13½
25 (and 100)	lb.	— —	.12
Rubber Resin 300	lb.	.13¾ -	.14
S.O.S.	gal.	.29 -	.34
Piccocizer 30	lb.	.05½ -	.06
Piccolastic A (and B, C, D, E)	lb.	.26 -	.26½
FT, FHF and FX	lb.	.1610 -	.1660
LC135	lb.	.2034 -	.2134
Piccolyte S Resins	lb.	.1510 -	.1654
Piccolyte WW Resins	**lb.**	**.45 -**	**.47**
Piccoumaron Resins	lb.	.051 -	.14
Piccovar	lb.	.1335 -	.14
Piccovol	**lb.**	**.02¾ -**	**.04**
Pictar	**gal.**	**.25 -**	**.30**
Pigmentar	lb.	.0410 -	.0534

PLASTICIZERS & SOFTENERS (Cont'd)

Pigmentarol	lb.	.0410 -	.0534
Plas-Blend 360	**lb.**	**.03 -**	**.04**
Plastac M	**lb.**	**— —**	**.09¼**
Plasticizer 2286	lb.	— —	.26¼
Plasticizer SC	lb.	.49 -	.52
Plasticizer VA-1	**lb.**	**— —**	**.46**
Plasticizer W-33	lb.	.37 -	.38¼
Plasticizer XP-3	**lb.**	**— —**	**.50**
Plastoflex 50	lb.	.26½ -	.29
52	lb.	.31 -	.32½
VS	lb.	.40 -	.42½
Plastogen	lb.	.07¼ -	.08
Plastolein 9050 (c.l.)	lb.	— —	.48
9055	lb.	— —	.39
9058	lb.	— —	.47
9250	lb.	— —	.31
9715	lb.	— —	.38
9720	lb.	— —	.30½
Plastone	lb.	.27 -	.30
Polycin 781	lb.	— —	.24
Polymel C-128	lb.	.19½ -	.20½
D	lb.	.22 -	.24
H-2	lb.	.22 -	.24
6	lb.	.0634 -	.10
7	gal.	.23 -	.28
Process Oil C-255 (c.l.)	gal.	— —	.22
Propylene Stearate (dms.)	lb.	— —	.32
PT 400 Pine tar (600, 800) (t.c., dms.)	**lb.**	**.0387 -**	**.0511**
Reogen	lb.	.11¾ -	.12
465 Resin (drums)	lb.	.05 -	.05½
Resin 731-C	cwt.	— —	13.50
Resin C	lb.	.0200 -	.0285
Resinex	lb.	.03¼ -	.03¾
L-4	lb.	**.02¼ -**	**.03**
Rexflex	lb.	— —	.15
Ridbo 369 (drums)	**lb.**	**.08 -**	**.09**
369-F (drums)	lb.	— —	.12
Rosin Oil	gal.	.54 -	1.20
R.P.A. No. 2	**lb.**	**— —**	**.65**
No. 3	**lb.**	**— —**	**.46**
No. 5	**lb.**	**— —**	**.57**
R.S.O. Softening Oil	lb.	.03 -	.05
Rubberol	lb.	— —	.21½
Rubtar	gal.	— —	.40
Santicizer B-16	lb.	.50 -	.52
E-15	lb.	.47 -	.49
M-17	lb.	.44 -	.46
No. 107	lb.	.40 -	.42½
No. 140	lb.	.29 -	.31
No. 141	lb.	.40 -	.42½
No. 160	lb.	.34 -	.36
Sherolatum	lb.	.0234 -	.05½
Shertospe F and F448	lb.	.1634 -	.1834
L	lb.	.1714 -	.19
N	lb.	.1714 -	.1834
T	lb.	.1634 -	.1834
Softener No. 20	gal.	.09 -	.25
S.P.C.	lb.	— —	.1914
Staflex IXA	lb.	.34 -	.36
Stanolind Petrolatum	lb.	.037 -	.085
Wax	lb.	.25 -	.30
Staralite Resin (dms.)	cwt.	— —	9.00
Sunny South Burgundy Pitch	lb.	.0790 -	.0835
Sunny South Pine Tar	lb.	.0350 -	.0473
Sunny South Rosin Oil	gal.	.50 -	.66
Superla Wax	lb.	.25 -	.30
Syncera Wax	lb.	.175 -	.225
Synplasticizer	lb.	— —	.10
Syn Tac (c.l.)	gal.	— —	.38
Tar, Refined	gal.	.12 -	.17
K Tarnel XR (t.c.)	lb.	— —	.0851
Ternene A	gal.	— —	.65
TP-90B	**lb.**	**— —**	**.65**
TP-95	**lb.**	**— —**	**.55**
TP98	lb.	— —	.50
Triacetin	lb.	.34 -	.45
Tricresyl Phosphate	lb.	.30 -	.3234
Turgum S	lb.	.0834 -	.0934
Vanadset A	gal.	.13 -	.20
Vistac No. 1	gal.	1.09 -	1.16
No. 2 (c.l.)	gal.	1.22 -	1.26
No. 4 (c.l.)	gal.	1.32 -	1.36
P	gal.	— —	.17
Witresin Granular	ton	43.00 -	43.00
Solid	ton	36.00 -	38.00

PROCESSING AIDS

Castor Oil, Processed (dms.)	lb.	— —	.2234
Refined (drums)	lb.	— —	.20½
Castorwax (min. 250 lbs.)	lb.	— —	.2834
Dutrex 7	lb.	.02½ -	.03¼
30	gal.	.24 -	.27
ELA	lb.	— —	.80
Heron S.P.O.	lb.	.23 -	.33
Millrex	**lb.**	**— —**	**.15**
Resin No. 510	lb.	.13½ -	.16½
Zyrox	lb.	.50 -	.79

PROTECTIVE & STABILIZING AGENTS

Acacia	lb.	.12¾ -	.21
Agchem SA-9 (to SA-12)	lb.	.65 -	1.02
Alpha Protein	lb.	.24 -	.28
Ammonium Alginate	lb.	— —	.95
Aroostocrat	lb.	.28 -	.38
Carob Bean Flour	**lb.**	**.33 -**	**.35**
Casein	lb.	.28 -	.38
Ethylene Diamine 68%	lb.	.57 -	.58
Karaya Gum	lb.	.20 -	.50
Prosein	lb.	.0600 -	.0630
Rex Compound No. 280	lb.	— —	.15
Stablex B	lb.	.50 -	.95
K	lb.	.27 -	.35
Tragacanth Flakes	lb.	**.60 -**	**1.35**

RECLAIMING AGENTS

Armeens C	lb.	.50 -	.58
T	**lb.**	**.42 -**	**.50**
No. 517 H.B. Oil	gal.	.11½ -	.16½
535	gal.	.22 -	.27
C-6 Oil (and 28, 32)	gal.	.33 -	.38
C-10 Oil	gal.	.25 -	.30
C-33 Oil	gal.	.17½ -	.22½
Caustic Soda—Flake 76% (c.l., drums)	cwt.	— —	3.60
Liquid 50% (t.c.)	**cwt.**	**— —**	**2.40**
Solid 76% (c.l., dms.)	cwt.	— —	3.20
Cresylic Acid (99-100%)	gal.	1.55 -	1.69
D-4	gal.	.23 -	.28
E-5	gal.	.21 -	.26
G. B. Reclaiming Oil	gal.	.12 -	.18
Heavy Aromatic Naphtha (t.c.)	gal.	— —	.12¼
LX 77 Reclaiming Solvent	gal.	.21 -	.30
LX-572 Reclaiming Oil	gal.	.23 -	.28
Neo-Fat D-242	**lb.**	**.05½ -**	**.07½**
PRR 1	gal.	.15 -	.35
PT 67 Light pine oil	gal.	— -	.50
PT 101 Pine tar oil	lb.	.0387 -	.0511
Q Oil	**gal.**	**.246 -**	**.296**
Reclaiming Oil 1621	**gal.**	**.03 -**	**.04**
Reclaiming Oil 3186 (t.c.)	gal.	.28 -	.3834
Reclaiming Oil 3186-G	gal.	.25 -	.3634
Reclaiming Reagent No. 4	lb.	.12 -	.15
R.P.A. No. 3	lb	— -	.46
Soda Ash (c.., bags)	**cwt.**	**— —**	**1.40**
Solvenol 1 (dms.)		— -	.36
Solvent 534	gal.	.20½ -	.26½
Solvent Oil 21	gal.	.24 -	.29
C-42	gal.	.23 -	.28
Union Solvent 4060-O	gal.	— -	147
X-1 Resinous Oil	lb.	.0190 -	.0285
X-60 Solvent	gal.	.24 -	.32

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Atlantic HPC 98	lb.	.0740 -	.1225
Continental F	lb.	.0740 -	.1225
Croflex	lb.	.0740 -	.1225
Crow	lb.	.0740 -	.1225
Dixiedensed (and S)	lb.	.0740 -	.1225
Kosmobile (and S)	lb.	.0740 -	.1225
Kosmos T	lb.	.0740 -	.1225
Micronex HPC	lb.	.0740 -	.1225
Spheron 4	lb.	.0740 -	.1225
Witco Dispers-o No. 6	lb.	.0740 -	.1225

Channel, Medium Processing (MPC) (bags)

Atlantic MPC 95	lb.	.0740 -	.1225
Continental A	lb.	.0740 -	.1225
Croflex TH	lb.	.0740 -	.1225
Dixie R 1	lb.	.0740 -	.1225
Dixiedensed HM (and S 66)	lb.	.0740 -	.1225
Huber Arrow TX	lb.	.0740 -	.1225
Kosmobile HM (and S 66)	lb.	.0740 -	.1225
Kosmos M	lb.	.0740 -	.1225
Micronex Standard	lb.	.0740 -	.1225
Spheron 6	lb.	.0740 -	.1225
Texas M	lb.	.0740 -	.1225
Witco Dispers-o No. 1	lb.	.0740 -	.1225

Channel, Easy Processing (EPC) (bags)

Atlantic EPC F 42	lb.	.0740 -	.1225
Continental AA	lb.	.0740 -	.1225
Croflex 77	lb.	.0740 -	.1225
Dixiedensed 77	lb.	.0740 -	.1225
Kosmobile 77	lb.	.0740 -	.1225
Micronex W-6	lb.	.0740 -	.1225
Spheron 9	lb.	.0740 -	.1225
Texas F	lb.	.0740 -	.1225
Witco Dispers-o No. 12	lb.	.0740 -	.1225
Wyex	lb.	.0740 -	.1225

Channel, Conductive (CC) (bags)

Dixie 5 Dustless	lb.	.0868 -	.1425
Kosmink dustless	lb.	.0868 -	.1425
Spheron C	lb.	.1200 -	.1600
Spheron X	lb.	.2300 -	.2800
Vulcan	lb.	.1800 -	.2150

Furnace, Fast Extruding (FEF) (bags)

Dixie 30	lb.	.0600 -	.1000
Kosmos 30	lb.	.0600 -	.1000
Statex M	lb.	.0600 -	.1000

Furnace, High Modulus (HMF) (bags)

Continex HMF	lb.	.0525 -	.0975
Dixie 40	lb.	.0550 -	.0950
Kosmos 40	lb.	.0550 -	.0950
Modulex	lb.	.0550 -	.0950
Statex 93	lb.	.0550 -	.0950
Sterling L	lb.	.0550 -	.0950
Sterling SO	lb.	.0600 -	.1000

Furnace, Medium Abrasion (MAF) (bags)

Philblack A	lb.	.0600 -	.1000

Furnace, Reinforcing (RF) (bags)

Dixie 60	lb.	.0790 -	.1175
Kosmos 60	lb.	.0790 -	.1175

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF	lb.	.0400 -	.0800
Dixie 20	lb.	.0400 -	.0800
Essex	lb.	.0400 -	.0800
Furnex	lb.	.0400 -	.0800
Gastex	lb.	.0400 -	.0800
Kosmos 20	lb.	.0400 -	.0800
Pelletex	lb.	.0400 -	.0800
Semunex	lb.	.0400 -	.0800
Sterling NS	lb.	.0400 -	.0800
Sterling R	lb.	.0450 -	.0800
Sterling S	lb.	.0400 -	.0800

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REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace, Fine (FF) (bags)

Statex B	lb.	.0650 -	.1050
Sterling 99	lb.	.0600 -	.1050

Furnace, High Abrasion (HAF) (bags)

Aromex	lb.	.0790 -	.1250
Philblack O	lb.	.0790 -	.1190
Statex K	lb.	.0790 -	.1250
Vulcan 3	lb.	.0790 -	.1220

Furnace, Very Fine (VFF) (bags)

Statex K	lb.	.0790 -	.1250

Thermal, Fine (FT) bags)

P-33 (c.l.)	lb.	— -	.0500

Thermal, Medium (MT) (bags)

Thermax (c.l.)	lb.	— -	.0325
Thermax, Stainless (c.l.)	lb.	— -	.0400

REINFORCING AGENTS—SILICA

Hi-Sil	lb.	.11 -	.12½

REINFORCING AGENTS—MISCELLANEOUS

Darex Copolymer No. 3	lb.	.42 -	.44
X34	lb.	.37 -	.39
X43 (and 43E)	lb.	.38 -	.40
Darex Copolymer Latex No. 3 (and X34)	lb.	.36½ -	.50
Durez 12687 (and 12707)	lb.	— -	.32
Durez 13355	lb.	— -	.26
Good-Rite Resin 50	lb.	.36 -	.38
Kralac A	lb.	.39 -	.40
Marbon S and S-1	**lb.**	**.36 -**	**.43**
8000	lb.	.38 -	.45
Marmix	lb.	.36 -	.43
Pliolite Latex 160	lb.	.30 -	.34
Pliolite NR	lb.	.74 -	.76
Pliolite So (and S6B) Resin	lb.	.36 -	.37
C-3 Masterbatch	lb.	.47 -	.48
C-4 Masterbatch	lb.	.45 -	.46
G Masterbatch	lb.	.35 -	.36
G50 Masterbatch	lb.	.35 -	.36
N Masterbatch	lb.	.40 -	.41
R Masterbatch	lb.	.43 -	.44
Polyco 220	lb.	.13 -	.15

RETARDERS

Dutch Boy Normasal	lb.	— -	.43½
ESEN	lb.	— -	.36
Retarder ASA	lb.	— -	.55
Retarder PD	lb.	.34 -	.36
Retarder W	**lb.**	**— -**	**.43**
Retardex	lb.	.47 -	.50

RUBBER SUBSTITUTES

Mineral Rubber

38	ton	38.00 -	40.00
Black Diamond	ton	38.00 -	40.00
Byerlyte	ton	47.00 -	54.00
Gilsonite, Scierts (c.l.)	ton	33.50 -	36.00
Hard Hydrocarbon (dms.)	ton	42.50 -	44.50
Herron Flake	**ton**	**48.50 -**	**49.50**
Mineral Rubber, solid	ton	42.50 -	44.50
Pioneer	ton	35.00 -	46.00

Vulcanized Vegetable Oils (Factice)

Amberex	lb.	.28 -	.32
Brown	lb.	.1310 -	.1955
Dispersed	lb.	.22 -	.42
Neophax	lb.	.16 -	.24
White	lb.	.13 -	.24

Miscellaneous Rubber Substitutes

G.B. Asphaltenes	lb.	.06 -	.06½
Gilsowax B	lb.	.09 -	.11
Resin No. 1098 (drums)	lb.	— -	.62
No. 1198	lb.	.46¾ -	.49¾

SOLVENTS

Acetone (dlvd.)	lb.	.08½ -	.11
American Dipentine	gal.	.35 -	.36
American Pine Oil	gal.	— -	.69½
Amsco Lactol Spirits (t.c.)	gal.	— -	.17
Rubber Solvent (t.c.)	gal.	— -	.16
Solv A (t.c.)	gal.	— -	.21½
Solv A-80 (t.c.)	gal.	— -	.26
Solv B (t.c.)	gal.	— -	.25
Solv B-90 (t.c.)	gal.	— -	.28½
Solv D (t.c.)	gal.	— -	.25¾
Special Naphthalite (t.c.)	gal.	— -	.16
Textile Spirits (t.c.)	gal.	— -	.17
Amyl Chlorides, Mixed (t.c.l.) (drums)	lb.	— -	.08
Aromatic Solvent 40	gal.	— -	.219
Benzol 90%	**gal.**	**.17 -**	**.24**
Butyl Acetate (t.c.)	lb.	.13 -	.175
Butyl Alcohol (t.c.)	lb.	.13 -	.175
Secondary (dlvd.)	lb.	.09 -	.11
Tertiary (dlvd.)	lb.	.12 -	.14
Carbon Bisulfide, Tech.	lb.	.0440 -	.0800
Carbon Tetrachloride	lb.	.08 -	.08½
Cosol 1	**gal.**	**.30 -**	**.38**
Cosol 2	**gal.**	**.30 -**	**.38**
Cyclohexane	lb.	.09¼ -	.11¾
Cyclohexanone	**lb.**	**.25 -**	**.27** *
Diacetone, Pure (dlvd.)	lb.	.12 -	.14½

SOLVENTS (Cont'd)

Dichlorethyl Ether (dms.)	lb.	.165 -	.17
Formal (dms.)	lb.	.265 -	.27
Dichloropentane (t.c.l.)	lb.	.04 -	.05½
Dicom	gal.	.30 -	.42
Dipentene 122 (dms.)	**gal.**	**.35 -**	**.36**
Halowax Oil	**lb.**	**.25 -**	**.37**
Heptanes (t.c.)	gal.	.17 -	.22
Hexalin Cyclohexanol	lb.	.20 -	.22 *
Hexanes (t.c.)	gal.	.17 -	.22
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.40 -	.57
Ether, Ref. (dlvd.)	gal.	.04½ -	.07
Mesityl Oxide (dlvd.)	lb.	.11½ -	.14
Methyl Acetone, Syn. (drums, dlvd.)	gal.	.615 -	.65
Methyl n-Amyl Ketone (drums)	lb.	.37 -	.39
Methyl Ethyl Ketone	lb.	.10 -	.12½
Methyl Isobutyl Ketone (dlvd.)	lb.	.12 -	.14½
N-5 Pentane Mix. (t.c.)	gal.	— -	.13½
N-6 Hexanes (t.c.)	gal.	— -	.14
N-7 Hexanes (t.c.)	gal.	— -	.13
Petrolene (t.c.)	gal.	— -	.10⅝
Picolines, Aplha, Refined	lb.	.75 -	1.00
Mixed	lb.	— -	.45
Proprietary Alcohol (t.c.)	**gal.**	**— -**	**.43½**
Pyridine, Refined	lb.	.80 -	.89
Quinoline	lb.	.50 -	.60
Rubber Solvent (t.c.)	gal.	— -	.16
Rubsol (t.c.)	gal.	— -	.08625
Skellysolve B (Hexanes) (t.c.)	gal.	— -	.148
C (Heptanes) (t.c.)	gal.	— -	.141
E (Octanes) (t.c.)	gal.	— -	.155
R (Solvent Naphtha)	gal.	— -	.114
Solvenol (dms.)	**gal.**	**— -**	**.36**
Solvent, Crude, Light	gal.	.19 -	.28
Solvesso 100 (t.c.)	gal.	— -	.28
150 (t.c.)	gal.	— -	.28
Sunny South Dipentene	gal.	.35 -	.36
Sunny South Pine Oil	gal.	— -	.69½
Toluene (drums)	gal.	— -	.28
Tolsol (t.c.)	**gal.**	**— -**	**.30**
Trichlorethane	lb.	.11 -	.12
Triglycol Dichloride (dms)	lb.	.53 -	.54
Tromex	lb.	.078 -	.083
Union Thinner 1	gal.	— -	.161
3	gal.	— -	.161
7	gal.	— -	.151
2-50-W Hi Flash	gal.	— -	.38
X-7 Sp. Heptanes (t.c.)	gal.	— -	.11

STABILIZING AGENTS (for Vinyl Resins)

Basic Silicate White Lead	lb.	.15¾ -	.16¼
No. 201	lb.	.20¾ -	.21¼
BVS	lb.	— -	.60
Cadmium Stearate	lb.	— -	1.25
Dutch Boy DS-207	lb.	— -	.53
Plumb-O-Sil A	lb.	.30½ -	.31¾
B	lb.	.31¾ -	.32½
Tribase	lb.	.27½ -	.40½
Dythal	lb.	— -	.60
Lead Stearate, Precip.	lb.	.36 -	.38
Fused	lb.	— -	.35½
Lithium Stearate	lb.	.63 -	.65
Stebelan E	lb.	1.25 -	1.40
XL	**lb.**	**.55 -**	**.65**
Stabilizer No. 3	lb.	— -	2.00
Stabilizer No. 21	lb.	— -	.90
Stabilizer No. 52	lb.	— -	2.00
Stabilizer E6B	lb.	— -	.85
Stabilizer JCX	lb.	— -	.49
Stabilizer L	lb.	— -	.60
Stabilizer SN	lb.	— -	.42
Stabilizer V-1-N	lb.	— -	.50
Stabilizer V-9	lb.	— -	.85
Stabilizer V-7939	**lb.**	**— -**	**.60**
Vanstay	**lb.**	**.33 -**	**.35**

SUN CHECKING AGENTS

Antisol	lb.	.25 -	.26
Antisun	lb.	— -	.21
Heliozone	**lb.**	**.25 -**	**.26**
Sharples Wax	lb.	.23 -	.28
Sunolite	lb.	.20 -	.23
Sunproof	lb.	.25 -	.26
Imp.	lb.	.23 -	.24
Jr.	lb.	.18 -	.19
Tonox	lb.	.50 -	.52

TACKIFIERS

Advaresin 100	lb.	.13½ -	.14
Agchem RC 30	gal.	.65 -	1.34
Arcco 493-49B	lb.	.15 -	.17
700-25A	lb.	.14 -	.16
U2-24	lb.	.11 -	.13
Beckopol 1400 (dlvd.)	**lb.**	**.25½ -**	**.26**
Dutrex 44	gal.	— -	.919
Galex (drums)	**lb.**	**— -**	**.15**
Indopol H-300 (bbls.)	gal.	1.12 -	1.16
Koresin	lb.	.73 -	.75
Nilox	cwt.	12.50 -	13.50
Pentalyn A (dlvd.)	lb.	.12½ -	.13
Resin V	lb.	— -	.23¼
Rubtack	lb.	— -	.12
Staybelite Ester No. 10 (dlvd.)	lb.	.19¾ -	.20¼
Super-Beckacite No. 1001 (dlvd.)	lb.	.34 -	.34½
Synthol	lb.	— -	.20½
Vistac No. 1	gal.	1.00 -	1.16
No. 2 (c.l.)	gal.	1.22 -	1.26
No. 4 (c.l.)	gal.	1.32 -	1.36
A	lb.	— -	.20¼
Zirex	cwt.	12.00 -	12.80

THICKENERS (FOR LATEX)

Alcogum AN 6	lb.	— -	.05
AN-10	lb.	— -	.08½
Betanol (drums)	lb.	— -	.70
Emulsorex No. 5	lb.	— -	.35
Lecithin	**lb.**	**.12 -**	**.17**
Modicol VD	lb.	— -	.12½
VE	lb.	— -	.10⅜
VF	lb.	— -	.10⅞
VK	lb.	— -	.07
Polyco 296	lb.	.13 -	.13½
Propylene Laurate (dms.)	lb.	— -	.36
Sodium Silicate	cwt.	1.50 -	2.65

VULCANIZING AGENTS

Selenium

Ancasal*	lb.	— -	2.00
Vandex	lb.	— -	2.25

Sulfur

Blackbird	**cwt.**	**— -**	**2.30**
Crystex	lb.	.19½ -	.23
Darex Dispersed Sulphur	lb.	.12 -	.17
Dispersed Sulfur	lb.	.12 -	.17
Devil (c.l.)	**cwt.**	**— -**	**1.75**
Insoluble Sulfur 60	lb.	.13 -	.13¼
Spider	**cwt.**	**— -**	**2.30**
Star (c.l.)	**cwt.**	**— -**	**2.25**
Tire (c.l.)	cwt.	— -	1.75
Tube	cwt.	— -	2.25

Tellurium

Ancatel*	lb.	— -	2.00
Latex Telloy	lb.	— -	2.00
Telloy	lb.	— -	2.00

WASHING & FINISHING AGENTS

Apcolene (t.c.)	gal.	— -	.09½

WETTING AGENTS

Advawet No. 10	lb.	— -	.35
No. 15	lb.	— -	.20½
No. 33	lb.	— -	.39
Aerosol OT 70% Clear	lb.	.80 -	1.00
Agchem SA-15 (16, 18)	lb.	.17 -	.29
Alrosol (dms.)	gal.	— -	.48
Aquarex D	lb.	— -	.76
MDL Paste	lb.	— -	.30
ME	lb.	— -	.92
NS	lb.	— -	.60
WA Paste	lb.	— -	.25
Areskap 50	lb.	.30 -	.38
Dry 100	lb.	.60 -	.72
Aresket 240	lb.	.30 -	.38
Dry 300	lb.	.60 -	.72
Aresklene 375	lb.	.42 -	.57
Dry 400	lb.	.70 -	.84
Armacs	**lb.**	**.29 -**	**.76**
Arquads	lb.	.21 -	.61
Etho-chemicals	**lb.**	**.34 -**	**.80**
Lecithin	lb.	.18 -	.26
Modicol L	lb.	— -	.58
N	lb.	— -	.40
S	lb.	— -	.22
Nopco 1086-A	lb.	.42 -	.50
1187-X	lb.	— -	.14½
Parnol	lb.	.13 -	.18
Santomerse D	lb.	.43 -	.65
S	lb.	.12 -	.25
Sorbit P	lb.	— -	.28
Stablex G	lb.	.50 -	.70
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RR-10	lb.	— -	.35
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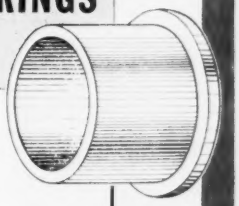

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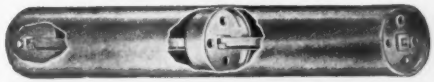

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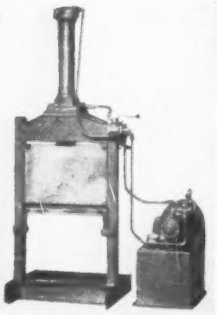

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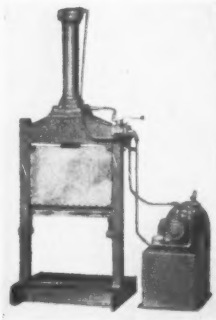

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